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Many Plants Boost Schedules

(See Page 437)

Early Plates Would Aid New Car Sale

Michigan Takes Lead in Issuance of Licenses Prior to January First

by Harold E. Gronseth

Detroit News Editor, Automotive Industries

Now that the motor industry is embarked on a program of early new car announcements the opportunity is open for governmental agencies in many states to further the Roosevelt Administration's efforts toward regularization of employment by facilitating new model sales through early issuance of next year's license plates. Michigan has set the example by moving forward to Nov. 1 the date on which 1936 plates go on sale.

How much of a deterrent to new model sales will be encountered in states where the license follows the car and the new car buyer is compelled to obtain a license plate good for only the balance of this year cannot, of course, be estimated. Dealers have found that it does act as a sales resistance and many buyers are inclined to hold off until the next year's plates can be attached to the new car.

An analysis of the practice in various states, as compiled by R. L. Polk, shows that the license follows the car in 19 states, that is the buyer can attach his old plates to the new car. Fortunately many of these states constitute some of the leading retail

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Independent Motor Unions Confer on Amalgamation

First step in the amalgamation of the three largest independent labor groups in the automotive industry into a single industrial union was taken Tuesday when delegates representing the Automotive Industrial Workers Association, the Mechanics Educational Society of America and the Associated Automobile Workers of America met at the Fort Wayne Hotel in Detroit for an informal conference on the subject.

The 30 delegates present, 10 from each union, recommended unification and decided to call a joint official conference of the three organizations for Nov. 3. James N. Campbell, president of the A.I.W.A., was chairman of the amalgamation conference and Mathew Smith, executive secretary of the M.E. S.A., was secretary.

AFL Union Workers at City Auto Stamping Strike

Toledo, Oct. 3.—After a five-minute ultimatum to sign a new contract was rejected by officials of the City Auto Stamping Co., about 450 members of United Automobile Workers International Union (AFL) struck shortly before noon. Workers rejected negotiated contract at meeting Monday night. Details are withheld by both sides. McGrady peace board is getting into action later today. Threats have been made to involve Bingham Stamping & Tool and Auto-Lite as both are closely allied.

Mr. Ford at Schenectady, N. Y., talks by wireless telephone from moving automobile with his Buenos Aires manager. Edsel Ford can be seen in rear seat

Indiana Financing Act Held Invalid

3 U.S. Judges Rule Upon Law; GM Acceptance Corp., McHenry Co. Brought Suit

Indiana's 1935 retail installment sales act, placing restrictions upon the finance charges which may be assessed against purchasers of automobiles and other merchandise by finance companies, was held to be unconstitutional Wednesday by three federal judges in United States District court in South Bend. This ruling was made at the conclusion of a hearing in which the General Motors Acceptance Corp. of Indiana and the McHenry Chevrolet Corp. of Indianapolis, sought to enjoin Governor Paul V. McNutt and the Indiana Department of Financial Institutions from enforcing the Act.

The hearing was marked by heated controversy between attorneys representing both the state and the plaintiffs. Six attorneys and two stenographers worked together for more than 25 consecutive hours while court recessed to reach agreements on findings of fact on which the court might base its judgment. The judges were Federal District Judge Thomas W. Slick, South Bend; Federal Circuit Judge George T. Page, Chicago; and District Judge Patrick T. Stone, of Madison, Wis. At the hearing on July 8, before the same judges, attorneys were ordered to prepare their findings of fact in the two cases at issue.

Fred B. Wiecking and Joseph W. Hutchins, Assistant Attorneys General of Indiana, represented the state at the hearings. They defended the Act on the grounds that excessive finance charges were being made in many cases prior to the act's passage and that public welfare was at stake. The plaintiffs asserted that the act sought to delegate illegally certain legislative powers to the State Department of Financial Institutions by allowing that department to fix maximum finance charges on merchandise retailing for less than $1,500. They also charged that the Act is in violation of due process clause of the federal constitution, tending to fix prices.

The state's attorneys have indicated that the case will be taken before the United States Supreme court. This would be the next step inasmuch as a federal circuit judge sat in the present hearing.

President Offers Industry Immunity From Sherman Laws for Voluntary Codes

Industry was again approached this week by President Roosevelt with a plan of procedure for adopting "voluntary" trade practice agreements under the skeletonized NRA and through the offices of the Federal Trade Commission. There is increasing evidence that Mr. Roosevelt is not going to relinquish his desire to have industry and commerce regimented under some plan of codification despite his pronouncement last week that he saw no particular reason for new NRA legislation if industry would oust the chiselers.

One of the classic features of this latest bid to industry to voluntarily regiment itself is the granting of immunity from action under the anti-trust laws under certain stipulations. Immunity from these laws would be guaranteed firms and groups joining in agreements covering labor practices and such limited fair trade stipulations as those contained in Section 7a. Concerns and groups willing to risk prosecution under the anti-trust laws would be granted a wider range in fair trade practices.

The voluntary code agreements have been divided into three distinct classes by the President. They are:

1. Agreements covering only labor standards including collective bargaining, minimum wages, maximum hours, prohibition of child labor. To insure immunity from action under the anti-trust laws such codes would have to have the approval of both the President and NRA as well as the FTC.

2. Agreements not to engage in certain trade practices contravening existing law, carrying with it immunity from anti-trust law action. However, no guarantee of immunity is given in this case if the trade practices contained in the agreement are not specifically forbidden by laws now on the statute books.

3. Agreements covering only fair trade practices approved by the FTC under its existing fair trade practice conference procedure. Such agreements, covering almost as wide a range of trade practices as those countenanced under the old NRA codes, theoretically do not carry immunity with them, but since the Trade Commission is the initiator of prosecutions under the anti-trust laws it is presumed no such move will be made if the Commission itself has sanctioned the agreement.

There appears to be little new in these provisions and apparently industry has little to gain by adopting such voluntary codes. There never has been any contention that the anti-trust laws prohibited adoption of industrial agreements on labor standards.

The procedure to be followed by any firm or group desiring to avail itself of the opportunity offered by the President is outlined in the White House statement as follows:

1. All proposed agreements to be filed with the Federal Trade Commission with labor and trade practice agreements appearing under separate titles.

2. Labor provisions to be referred to NRA by the FTC; the former to confer with a labor advisory unit and an industrial advisory unit and to hold open hearings before deciding upon approval or disapproval.

3. Upon Presidential approval of labor provisions the FTC shall make an order approving these provisions which it will in the meantime have to examine. The Commission will be the custodian of the agreement.

This latest move by the President followed closely upon his appointment of Major George L. Berry to "coordinate and report" on duties, compensations and functions of NRA officials. At the same time the appointment coincided with the resignations of Prentiss L. Coonley and Willard Thorp. Mr. Coonley announced his retirement to private business and Mr. Thorp has become associated with Dun & Bradstreet. Major Berry's title, according to the President's order is Coordinator for Industrial Cooperation. He is president of the Printing Pressmen's Union and an AFL official.

Hudson's Initial 1936 Car Orders, 25,000

Hudson must produce 25,000 cars by Jan. 1 to fill initial orders for 1936 models placed by distributors while attending a sales conference at the factory, according to an announcement this week by Roy D. Chapin, president. Hudson plants, it was announced will go into quantity production on new models this week.

Eaton Pays Extra Dividend

Eaton Manufacturing Co. directors this week voted the regular quarterly dividend of 25 cents and an extra 12½ cents. The same extra was voted three months ago. This makes $1.25 a share the company will have paid this year.

Rolls-Royce to Announce New Model With V-12 Motor

(Special cable to Automotive Industries)

Rolls-Royce, Ltd., on Wednesday, Oct. 2, announced a new model with V-12 engine which is to replace the current 40/50, a six-cylinder car. Engine displacement is 450 cu. in. and wet liners are used. The engine is of the valve-in-head type and has means for automatically taking up the valve clearance. A four-speed synchromesh transmission is used. Final drive is through hypoid gears. Front suspension is of the wishbone type (which is evidently the British term for the system of independent front suspension in which the steering head is connected to the chassis by wishbone-shaped links —*Editor*). Brakes are applied through a servo device. The price of the chassis is $9,250.

Report Japanese, GM Hold Conference on Ownership

The Japanese Ministry of Commerce and representatives of General Motors, are reported to have conferred upon the matter of the corporation's willingness to have the majority of the stock in its Japanese subsidiary held by Japanese interests. However, no details of this reported conference had been received at General Motors headquarters in this country at mid-week.

This move is in line with a previously announced Japanese policy of insisting that majority stock holdings in foreign companies operating within the Empire be vested in domestic interests. Of the motor companies operating in Japan GM and Ford would be the most directly affected. Some months ago when this question first was raised there was considerable speculation whether these automotive units would continue Japanese operations.

Henry Ford examines a flaw detector in GE plant at Schenectady where a 110,000 kilowatt turbine built for the Ford company is being tested.

NASFC to Cooperate With Dealers In Building Up Financial Position

A resolution instructing the directors and management of the National Association of Sales Finance Companies to cooperate with dealer groups in building up the financial strength of automobile retailers and in promoting their interests, was adopted at the annual meeting of the association, held last week at White Sulphur Springs, Va. A copy of this resolution was ordered sent to the National Automobile Dealers Association.

The meeting also adopted a resolution authorizing the directors to take steps to promote a national advertising campaign designed to acquaint the public with the merits of sales financing, remove misunderstandings regarding it, and to show that sound credit principles are in the interests of buyers. It was indicated that the type of campaign under consideration would cost from $30,000 to $50,000.

At the roundtable discussions, interest centered on regulatory legislation, competition of the government and of the commercial banks, the effects of present easy money and capital loans. There is no doubt that the avalanche of legislation directed at sales financing which appeared at last winter's sessions of state legislatures is causing the companies considerable concern. The members did not appear fearful of laws intended to correct recognized abuses, but are alarmed at some of the arbitrary restrictions that have been proposed and that the tendency in some cases to vest extremely broad discretionary powers in the regulatory authority. In this connection, it was stated that dealer rebates were one of the practices most frequently criticized by opponents of regulatory legislation. These rebates, which with coercion, have long been among the most controversial issues in finance company circles, however, were not considered at any great length.

John R. Walker, executive vice-president, expressed the view that the dealer was entitled to some participation in the finance charge for his part in acquiring the business. He said, however, that he did not feel that the rebate should be related to the unpaid balance since that gave the dealer an interest in making the balance bigger. This view seems to overlook the original purpose of these rebates which was to cover the dealer's risk in connection with his contingent liability on recourse and repurchase paper, and this risk, of course, is a function of the amount of the unpaid balance.

On wholesale financing, the consensus seemed to be that while this was not a particularly profitable phase of the business, it was a necessary and legitimate service. Competitively, it seemed to be regarded as of increasing importance in view of the growing tendency of commercial banks to offer financing service direct to purchasers who wish to buy on instalments. Incidentally, the view was expressed that Washington favors the banks entering this field for one reason because it would broaden federal control over credit.

Cheap money is not proving an unmitigated blessing to the finance companies as it is apparently intensifying competition to the point that some of the practices currently being indulged in are occasioning real concern about the ultimate consequences. And of course, competition from commercial banks is to some extent due to the plethora of money. Capital loans to dealers, which include the provision of working capital outside of wholesale new and used car financing, were attacked and defended, whether they are sound or not depending on the circumstances surrounding the individual case.

Glenn B. Ryman, president of the American Discount Co., Atlanta, Ga., was elected president of the association.

It is reported that as a part of its public relations program the association will substitute a printed magazine for the bulletins on which it has previously depended.

Graham Sees 650,000 Unit Export in 1936

Industrial — Agricultural Alliance Advocated by E. W. Smith at AMA Committee

Eliminating the possibilities of a foreign war, automobile exports during the next year should reach a volume of approximately 650,000 units, Robert Graham, vice-president of Graham-Paige and chairman of the AMA Export Committee, said at last week's meeting of the committee at Detroit. Mr. Graham said exports this year had held up so well that the original estimate of 530,000 units is likely to be exceeded.

Indicating some of the difficulties confronting the sale of American made automobiles overseas, Mr. Graham said that trade barriers established since 1929 have in many markets become prohibitive.

An alliance "between the efficient industries and the agricultural community in support of the administration's foreign trade policies" was advocated by Edgar W. Smith, Vice-President, General Motors Export Company, as he gave credit to the trade agreements program for much of the progress made in exports to date.

"The gain in the overseas market for motor vehicles abroad since 1932 again has been confined largely to the American-built product," Mr. Smith said. "The total market abroad for cars and trucks will be up 88 per cent in 1935 from 1932; the market for foreign-source vehicles will be up 69 per cent; the market for American-source vehicles will be up 163 per cent. In the non-manufacturing markets, outside of England, France and Germany, the result is even more striking: the total market will show a gain of 97 per cent in the three years in question; the market for foreign cars will show a gain of 29 per cent, and the market for American cars will show a gain of 146 per cent.

"Expressed otherwise, in the world as a whole, outside of the United States and Canada, the American motor vehicle, which had dropped to 21 per cent of the total consumption in 1932, will be back again this year to 29 per cent; and in the non-manufacturing markets the increase in this regard will be from 61 per cent to 72 per cent.

C. M. Wynne, Diamond T Truck Co., and motor industry delegate to the International Chamber of Commerce meeting in Paris last June, reported that business men of 50 leading nations endorsed all phases of the Roosevelt Administration's foreign trade program including the most-favored-nation clause. The automobile industry in this country was among the first of the major industries to support this phase.

Karl Bronson
who returns to DeSoto as Advertising Manager

Oldsmobile 1935 Output To Exceed 175,000 Cars

Before the end of the year Oldsmobile will have produced more than 175,000 cars, C. L. McCuen, president and general manager, announced. This is more than double the 1934 production, and more than four times the number of units built and shipped in 1933. The 1,000,000th Oldsmobile came off the assembly line on Thursday last week.

The company this week got under way with the program mapped out for 1936 by D. E. Ralston, vice-president and general sales manager. Almost 600 dealers and retail salesmen of the Detroit zone gathered at Lansing this week in the first of a series of dealer meetings which will be held in every Oldsmobile zone in the country.

The dealers were shown Oldsmobile's 1936 cars, and visited the expanded plants, which already are running at the rate of 750 cars a day. Cars are being shipped to every zone and dealer meetings will be held during October all over the country, Mr. Ralston said.

The annual preview for the people of Lansing was conducted at the showrooms of the Lansing Oldsmobile Company, just remodelled.

Kettering Sees Industry in Second Phase of Progress

After experimenting with "economic perpetual motion," America finds it has exactly the same prosperity ingredients that it has had for many years—material resources and the time of human beings to work them—declared Charles F. Kettering, vice-president of General Motors, speaking at a banquet of 500 Cadillac-LaSalle distributors and sales managers Monday evening.

The banquet followed a business meeting at the General Motors Proving Grounds, where the visitors assembled again Tuesday for personal tests of the 1936 Cadillac and LaSalle cars on the four-mile speed loop.

Mr. Kettering predicted the industry is entering its second phase of progress.

"The electrical industry made its really big strides in the second 25 years of its existence," he said. "And so will it be in the automotive industry. Progress in automotive design has not stopped. I hope it never will stop, because the automobile is the first device to take us out of the monotony of life which preceded its advent. Monotony is nothing but remaining in the same environment. The automobile solved that by permitting us to go somewhere else. Also it contributed substantially to human self-esteem by making experts out of all of us, for an expert is nothing but a mechanic away from home."

Speakers were introduced by J. C. Chick, Cadillac general sales manager. All expressed the opinion the market for fine cars would show a sharp upturn during the remainder of 1935 and throughout 1936. Among the other speakers were S. S. Knudsen, R. H. Grant, and Nicholas Dreystadt, Cadillac general manager.

Early Plates Would Aid New Car Sales

(*Continued from Page* 433)

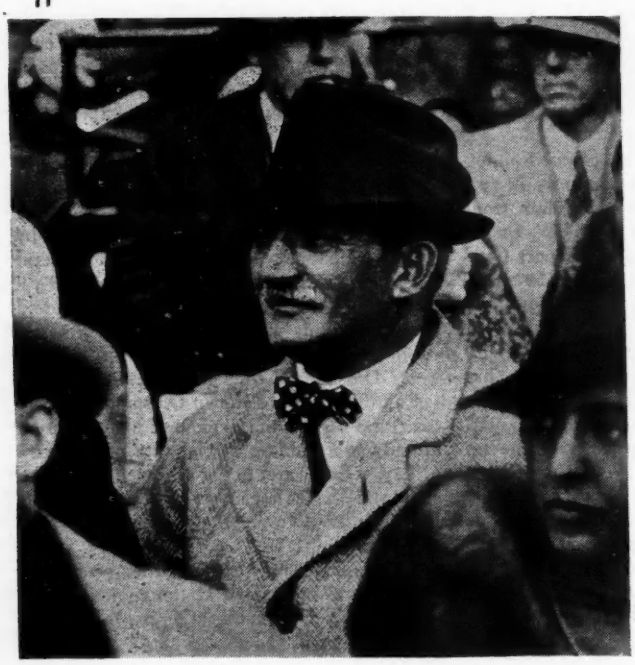
markets, including New York, Pennsylvania, Illinois, Ohio, Massachusetts, New Jersey, Missouri and Indiana. These states last year accounted for approximately one half of the 1,888,557 new cars registered.

In 30 states, including the District of Columbia, the new car buyer must also purchase a new license, since in 27 of these states the license follows the old car and in the remaining three the licenses are cancelled. Only in six states, however, are full year's licenses required at this season, but these states have flat fees which are usually small. Fourteen states allow a reduction of 75 per cent, four states 50 per cent and in seven states licenses are on a monthly basis.

In states where there is a flat fee and where a 75 per cent reduction is allowed at this time of the year the purchase of a new license plate should not prove much of a consideration in buying a new car. Sales executives feel, however, that the making available of next year's plates by the time of the national shows, when most new models will be on the market, would materially stimulate sales and further the cause of more uniform employment in the motor industry to which the various companies have given such whole-hearted support.

Motor Moguls at Series

Mr. and Mrs. Henry Ford (right) go out to root for Detroit. W. S. Knudsen (left), GM's executive vice-president, watches opening game from box seat. Some action at first base, Tiger Greenberg loses both ball and glove in crash with Cub Galan



Plymouth Can Produce 500,000 Cars Yearly; Announce New Models Oct. 26

Rushing its expansion program to completion the Plymouth Corp. has begun production of its 1936 models with increased manufacturing facilities for a record-breaking output.

Plymouth is equipped to place more than 100,000 new cars on the market before the first of the year, according to D. S. Eddins, president. Completion of the expansion program in October will give Plymouth facilities for producing more than 500,000 cars annually. New Plymouth models will be formally introduced to the public October 26. Dealer previews of the new cars were held in 34 major cities throughout the country during the first week of this month. Details of the new car, said to involve more than two score engineering improvements, are being closely guarded until the public announcement date.

The Plymouth expansion program, started several months ago, includes four new additions to the main Detroit factory, the opening of a new branch assembly plant in Evansville, Ind., and preparations for increased production in the Los Angeles plant. Altogether the expansion program and retooling for the 1936 models is costing the company more than $5,000,000.

Plymouth started production with several hundred cars rolling off the assembly lines daily in the Detroit factory. The Los Angeles and Evansville plants are scheduled to begin assembly operations this month. With the three plants in operation Plymouth plans to step-up its output rapidly to a projected peak of 2300 cars daily.

Material commitments for the new models reflect the increased production schedules. The company already has ordered $6,500,000 worth of steel, malleable iron, rubber, mohair, plate glass and other materials that go into the new cars.

The additions to the Detroit factory give Plymouth nearly 1,000,000 square feet of floor space in its main plant.

Packard's Schedule Biggest in History

Immediately following announcement of its 1936 models, Packard Motor Car Co. launched into the biggest production schedule of its history. Shipments for Sept. 30, the day before formal announcement of the new cars, were the greatest for any day since Packard began building cars in 1899, totaling 372 automobiles.

M. M. Gilman, vice-president and general manager, announced that production schedules for October call for the building of 7000 cars. This would exceed the biggest previous production for any one month by 500 cars.

Eastman, Hoffman Speakers At Transportation Meeting

Joseph B. Eastman, Federal Coordinator of Transportation; Governor Harold B. Hoffman, New Jersey, and Roy F. Brittan, director, National Highway Users Conference, will be the principal speakers at the dinner to be held in conjunction with the Regional Transportation Meeting being sponsored by the Metropolitan Section, S.A.E., in conjunction with the Motor Truck Show in Newark, N. J., Oct. 29 to Nov. 1. The dinner will be held Tuesday night, Oct. 29.

The program for the meeting follows:

Wednesday, Oct. 30—afternoon session—Interstate Commerce Commission Regulation; evening session—Service Problems; speakers: O. M. Brede, Clinton Brettell and T. L. Preble.

Thursday, Oct. 31—highway session—speaker, James Shanley, chief inspector, Motor Vehicle Division, State of New Jersey; subject, "Motor Vehicle Inspection"; afternoon session—Fuels and Lubricants; speaker, T. C. Smith.

Friday, Nov. 1—afternoon session—speaker, C. R. Kelley, Waukesha Motor Co.; subject, "The Operation and Engineering Problems of the Injection Engine"; evening session—Tires and Springs; speakers, S. Ward Widney and B. J. Lemon; subject, "Tires, Springs and Shock Absorbers Testing Developments."

Buick New Car Orders Total $25,000,000

Production Schedules Boosted Rapidly; 686 Units Off Line in Day

Buick Motor Company reports orders for more than $25,000,000 worth of new Buicks are on the books—the immediate result of the nation-wide announcement of the company's 1936 cars.

To meet the largest demand experienced at announcement time in nearly 10 years, factory production schedules are being boosted rapidly, with the result that Buick output during October will be the highest for any month since August, 1930. With the exception of that month it will be the highest for any similar period since the introduction of the new models in 1929. Present schedules for October call for the production, both domestic and export, of 16,000 cars.

W. F. Hufstader, general sales manager, said that for the first time since Buick's upturn two years ago the company's production capacity is being taxed to meet the requirements of the field.

"Orders on hand and cards in the field have accounted for a required output of more than 26,000 units to meet immediate needs," Mr. Hufstader said. "Of this number approximately 12,000 cars have been produced and were in the hands of dealers on announcement day. Unfilled orders at the factory at the opening of business September 30 totalled 13,870 and this figure is mounting despite increases in the production rate."

An additional night shift has been added by the Fisher Body plant here, necessitated by the increased demand of the Buick final assembly line. With this and other schedules boosted, it was estimated by the Buick management that an average of more than 700 cars a day will be rolling off the assembly line before the end of the week.

Production during week ended September 28 averaged more than 600 a day. The highest single day's production since 1930 was reached on September 26 when 686 cars were produced. Daily shipments are paralleling the production rate.

British Motor Engineers Open Annual Sessions

The Institution of Automobile Engineers (Great Britain) held the opening meeting of its annual session at the Royal Society of Arts in London, Tuesday, Oct. 1. The society's new president, A. J. Hancock, was inducted into office and delivered the Presidential Address.

Eight Months Production Increases 544,676 Units Over Same '34 Period

Production—Cars and Trucks—U. S. and Canada

	August, 1935	July, 1935	August, 1934	Eight Months, 1935	Eight Months, 1934
Passenger cars—U. S. and Canada					
Domestic market—U. S.	168,269	259,277	....	2,160,798	....
Foreign market—U. S.	14,120	16,807	....	170,106	....
Canada	5,524	9,471	7,325	105,383	82,816
Total	187,913	285,555	190,825	2,436,287	1,891,611
Trucks—U. S. and Canada					
Domestic market—U. S.	43,911	45,477	....	401,039	....
Foreign market—U. S.	13,751	15,483	....	107,297	....
Canada	2,168	3,598	2,579	26,705	20,286
Total	59,830	64,558	53,890	535,041	425,498
Total—Domestic Market—U. S.	212,180	304,754	....	2,561,837	....
Total—Foreign Market—U. S.	27,871	32,290	....	277,403	....
Total—Canada	7,692	13,069	9,904	132,088	103,102
Total—Cars & Trucks—U. S. and and Canada	247,743	350,113	244,715	2,971,328	2,317,109

New Passenger Car Registrations Gain 39.7% in 8 Mos.; Ford Leads Big Three

Passenger Car Registrations

	August, 1935	July, 1935	August, 1934	Eight Months 1935	Eight Months 1934	Per Cent Change 8 Mos., 1935 over 1934	Numerical Change 8 Mos., 1935 over 1934	Per Cent of Total Eight Months 1935	Per Cent of Total Eight Months 1934
Ford	61,590	83,203	54,112	633,261	412,597	+53.5	220,664	31.96	29.10
Chevrolet	68,281	71,226	55.507	451,671	391,279	+15.6	60,392	22.80	27.60
Plymouth	32,147	40,674	33,107	285,878	230,381	+24.0	115,889	14.43	16.24
Dodge	14,888	18,951	8,420	130,762	67,863	+91.6	62,899	6.60	4.79
Oldsmobile	11,839	15,632	8,524	107,911	52,066	+108.0	55,845	5.45	3.67
Pontiac	11,906	15,208	6,602	102,238	56,928	+79.7	45,310	5.16	4.02
Buick	4,717	6,700	5,808	45,493	44,736	+1.7	757	2.30	3.16
Terraplane	4,583	5,454	3,646	38,878	30,530	+23.2	8,348	1.96	2.15
Chrysler	3,443	4,542	2,922	32,037	19,233	+66.9	12,804	1.62	1.36
Studebaker	3,317	3,913	3,640	28,306	31,288	—9.5	—2,982	1.43	2.21
Packard	3,741	4,259	635	21,203	4,282	+395.0	16,921	1.07	.30
DeSoto	2,468	3,057	1,335	19,785	8,341	+137.5	11,444	1.00	.59
Hudson	1,600	2,081	1,692	15,328	14,604	+5.0	724	.77	1.03
Nash	1;702	2,081	961	12,116	10,591	+14.3	1,525	.61	.75
La Fayette	2,181	1,872	1,341	11,795	5,538	+113.0	6,257	.60	.39
Graham	1,570	1,763	1,288	11,609	9,751	+19.0	1,858	.59	.69
La Salle	1,056	1,101	446	7,805	3,799	+105.0	4,006	.39	.27
Willys	860	1,157	884	6,890	5,033	+37.0	1,857	.35	.35
Hupmobile	627	727	662	5,689	4,063	+40.0	1,626	.29	.29
Auburn	415	522	509	3,948	3,411	+15.9	537	.20	.24
Cadillac	314	457	309	3,436	3,644	—5.5	—208	.17	.26
Reo	370	365	394	2,714	2,759	—1.8	—45	.14	.19
Lincoln	133	129	203	1,196	1,424	—16.1	—228	.06	.10
Pierce-Arrow	72	87	184	537	1,338	—59.8	—801	.03	.09
Miscellaneous	31	34	67	483	2,280	—78.8	—1,797	.02	.16
Total	233,851	285,195	193,198	1,980,969	1,417,759	+39.7	563,210	100.00	100.00
Chrysler Corp.	52,946	67,224	45,784	468,462	325,818	+43.8	142,644	23.65	22.98
Ford and Lincoln	61,723	83,332	54,315	634,457	414,021	+53.2	220,436	32.02	29.20
General Motors	98,113	110,324	77,196	718,554	552,452	+30.1	166,102	36.27	38.97
All Others	21,069	24,315	15,903	159,496	125,468	+27.1	34,028	8.06	8.85

Truck Registrations

	August, 1935	July, 1935	August, 1934	Eight Months 1935	Eight Months 1934	Per Cent Change 8 Mos., 1935 over 1934	Numerical Change 8 Mos., 1935 over 1934	Per Cent of Total Eight Months 1935	Per Cent of Total Eight Months 1934
Ford	16,429	18,073	14,055	131,816	88,050	+49.6	43,766	37.06	32.26
Chevrolet	18,554	18,608	15,790	121,358	107,410	+13.0	13,948	34.12	39.34
Dodge	5,723	5,336	4,754	39,755	30,973	+28.4	8,782	11.18	11.34
International	5,231	5,308	2,809	34,970	20,645	+69.3	14,325	9.83	7.56
G.M.C.	1,312	857	1,033	7,101	6,463	+10.0	638	2.00	2.37
Diamond T	591	593	508	4,477	3,815	+17.4	662	1.26	1.40
Reo	476	439	439	3,480	3,553	—2.0	—73	.98	1.30
White	236	233	296	1,970	2,940	—33.0	—970	.55	1.08
Studebaker	264	219	138	1,488	1,076	+38.7	412	.42	.39
Willys-Overland	253	298	7	1,409	20		1,389	.40	.01
Federal	219	202	162	1,366	1,315	+4.0	51	.38	.48
Mack	145	147	143	1,020	1,367	—25.2	—347	.29	.50
Brockway	143	114	107	783	872	—10.2	—89	.22	.32
Autocar	91	99	61	588	690	—14.8	—102	.17	.25
Terraplane	77	86	52	511	320	+59.7	191	.14	.12
Stewart	94	85	56	506	571	—11.3	—65	.14	.21
Plymouth	110	129	15	414	88	+370.0	326	.12	.03
Indiana	118	103	41	364	435	—16.3	—71	.10	.16
Henney	43	49	33	320	164	+95.1	156	.09	.06
Divco	46	33	17	225	177	+27.1	48	.06	.06
Austin	5	10	6	158	395	—60.0	—237	.04	.14
F.W.D.	17	24	7	138	82	+68.5	56	.04	.03
Sayers & Scoville	23	24	11	132	95	+39.0	37	.04	.03
Meteor	18	17	24	120	126	—4.8	—6	.03	.05
Sterling	9	19	15	114	88	+29.8	26	.03	.03
Buick	1	4	11	107	96	+11.5	11	.03	.04
Twin Coach	20	23	24	97	121	—19.9	—24	.03	.04
Miscellaneous	107	111	176	874	1,077	—18.8	—203	.25	.40
Total	50,355	51,243	40,790	355,661	273,024	+30.0	82,637	100.00	100.00

Estimated Dollar Volume for Jan.-Aug. Period Shows 37.3% Gain Over 1934

U. S. New Car Registrations and Estimated Dollar Volume by Retail Price Classes—Eight Months

	UNITS					ESTIMATED DOLLAR VOLUME *				
	1935	1934	Per Cent Change	Per Cent of Total 1935	Per Cent of Total 1934	1935	1934	Per Cent Change	Per Cent of Total 1935	Per Cent of Total 1934
Chevrolet, Ford and Plymouth	1,370,810	1,034,207	+32.8	69.22	72.96	$841,900,000	$638,100,000	+32.0	61.71	64.22
Others under $750	283,262	65,100	+335.0	14.30	4.59	202,100,000	44,500,000	+354.0	14.81	4.48
$751-$1,000	257,791	256,033	+0.6	13.02	18.06	218,200,000	209,600,000	+4.0	15.99	21.10
$1,001-$1,500	54,820	41,297	+32.9	2.76	2.91	64,700,000	51,100,000	+26.8	4.74	5.14
$1,501-$2,000	4,659	10,456	—55.4	.24	.74	7,900,000	18,400,000	—57.0	.58	1.85
$2,001-$3,000	6,166	7,629	—19.0	.31	.54	17,000,000	20,900,000	—18.6	1.25	2.10
$3,001 and over	2,995	2,774	+8.0	.15	.20	12,500,000	11,000,000	+13.8	.92	1.11
Total	1,980,503	1,417,496	+39.7	100.00	100.00	$1,364,300,000	$993,600,000	+37.3	100.00	100.00
Miscellaneous	483	213	+127.0							
Total	1,980,986	1,417,709	+39.7							

* All calculations are based on list price F. O. B. factory of the five-passenger, four-door sedan in conjunction with actual new car registrations of each model. The total dollar volumes for the different models are then consolidated by price classes.

Aug. Total Rises 20.6%; Dollar Volume 20.3%

U. S. New Car Registrations and Estimated Dollar Volume Retail Prices Classes—August

	UNITS					ESTIMATED DOLLAR VOLUME *				
	1935	1934	Per Cent Change	Per Cent of Total 1935	Per Cent of Total 1934	1935	1934	Per Cent Change	Per Cent of Total 1935	Per Cent of Total 1934
Chevrolet, Ford and Plymouth	162,018	143,202	+13.1	69.29	73.89	$96,900,000	$86,100,000	+12.5	61.44	65.68
Others under $750	34,448	5,953	+478.7	14.73	3.07	24,400,000	3,800,000	+543.0	15.47	2.90
$751-$1,000	29,013	38,629	—24.9	12.41	19.93	24,500,000	31,200,000	—21.5	15.54	23.80
$1,001-$1,500	7,183	3,755	+91.3	3.07	1.94	8,300,000	4,700,000	+76.8	5.26	3.58
$1,501-$2,000	87	1,295	—93.2	.04	.67	200,000	2,300,000	—91.3	.13	1.75
$2,001-$3,000	723	660	+9.5	.31	.34	2,000,000	1,800,000	+11.1	1.27	1.37
$3,001 and over	348	311	+11.9	.15	.16	1,400,000	1,200,000	+16.8	.89	.92
Total	233,820	193,805	+20.6	100.00	100.00	$157,700,000	$131,100,000	+20.3	100.0[	100.00
Miscellaneous	31	23	+34.8							
Total	233,851	193,828	+20.6							

* All calculations are based on list price F. O. B. factory of the five-passenger, four-door sedan in conjunction with actual new car registrations of each model. The total dollar volumes for the different models are then consolidated by price classes.

Merit, Not Rackets Proper Reward Basis, Wilson Says

Merit, not rackets, class distinctions and special privileges to minorities should be the basis of reward in industry C. E. Wilson, GM vice-president, told 500 members of the Foremen's Club in Toledo.

"I believe we must restore the foreman to responsibility and authority," Mr. Wilson said. "I believe in the principles of business and government which built the nation. Competition is inseparable with Progress. Merit should be the basis of reward and not rackets, class distinctions and special privileges."

Parking Meters for Dallas

The City Commission of Dallas will install 1,000 parking meters upon the streets, and if the new system proves a success an additional 1,000 will be put in. The cost of each meter is $30. It is stated that 20-foot stalls will be painted on the streets and curbs to provide ample parking space for each vehicle. This system is similar to that in use at Oklahoma City.

Penna. Asks Editors' Aid in Promotion of Safety

A recent issue of Pennsylvania's "Capitol News," a weekly publicity release medium for the state government, carried the following item in the interest of safety.

"Note to Editors: Advertising men claim that 'reiteration is reputation'. Even the dumbest automobile driver who sees a safety slogan a few thousand times may be affected by it and drive more carefully. In safety campaigns two have been used. They are 'Take Time to Be Safe' and "Afoot or Awheel the Slogan is—'Ware the Autos'. Do you believe the use of one at the end of each auto accident story would be effective?"

Estimate $146,427 Third Quarter Profit for Parker

W. M. Cornelius, president of Parker Rust Proof Co., estimates that the company's current quarter earnings will be substantially the same as for the third quarter of last year when net profit amounted to $146,427 after depreciation and other deductions but before federal taxes. July and August were substantially the same as corresponding months last year and indications are that September will be at least as good as a year ago, he stated. Parker has installed in automobile and parts plants and other industries the largest capacity for using its rust proofing formula in its history.

Fisher Joins Republic

E. J. P. Fisher, metallurgist of the Keystone Steel & Wire Company, Peoria, Ill., has resigned to accept a similar connection with the Republic Steel Corporation.

Two-Thirds of Chrysler 10-Year Income Spent for Material, General Expenses

Approximately two-thirds or $1,790,000,000 of Chrysler's 10-year income of about $2,590,000,000 was spent for materials and general expenses and the second largest amount, about $490,000,000, went for wages and salaries, Walter P. Chrysler, board chairman, told stockholders in a letter this week accompanying third quarter dividend checks. Much of the larger amount, Mr. Chrysler said, went into wages for labor employed by the corporation's suppliers.

"From 1925, through the first six months of this year," Mr. Chrysler said. "Chrysler has sold more than 3,600,000 cars and trucks and other products for which it received approximately $2,590,000,000 exclusive of miscellaneous income from other sources. Out of this amount, the largest expenditures, nearly two-thirds of the total, were for materials and general expenses (exclusive of wages and salaries) and advertising. The expenditures took approximately $1,790,000,000, the greater part of which went into jobs and wages of workers in industries supplying the automobile manufacturing industry. The second largest expenditure, nearly one-fifth of the total, was paid directly to Chrysler Corp.'s employees. This amounted to nearly $490,000,000."

Mr. Chrysler pointed out in his letter that additional manufacturing facilities to care for the increased volume of business cost about $111,000,000 and that this amount does not include the Dodge Bros. purchase in 1928. Dodge properties were acquired through the exchange of Chrysler common stock. Taxes represented nearly $71,000,000 of the total and bondholders received $84,000,000 in interest and principal. Common stock investors have been paid approximately $79,000,000 in dividends. The corporation, Mr. Chrysler said, had consistently paid dividends every quarter since its organization with the exception of the first and second quarters of 1933.

ICC Suspends Five More Carrier Act Provisions

In an order issued Sept. 30 the Interstate Commerce Commission postponed until October 15, the application of Sections 206, 207, 208, 209, and 211 of the Motor Carrier Act. Recently the provisions dealing with rates and rate making were suspended until next April.

These sections deal with the applications for certificates of convenience and necessity for common carriers, permits for contract carriers, and licenses for brokers. The Commission stated that notice of the postponement should be given to motor carriers subject to the Act and to the public by depositing a copy of the order in the office of the Secretary of the Commission at Washington, D. C.

Auburn Producing Line of Limousine-Type Bus

Production has started by Auburn on a line of new twelve-place, limousine-type buses designed primarily for airline use, Roy H. Faulkner, president, has announced.

First orders were received on these cars early last week from one of the leading airlines, Mr. Faulkner said. This limousine-type bus is of ultra-modern design with roomy body and is conservatively streamlined. Access is through sedan-type side doors.

These new Auburn buses are built on 163-in. wheelbase, powered with 115 hp. Straight Eight Lycoming engine. Brakes are hydraulic internal expanding, and the chassis contains such features as Double X-plus-A chassis frame construction; 62-inch rear tread; down draft Stromberg Duplex carburetor; rubber bushed-type spring shackles; and Ross full roller cam-and-lever steering gear. Three needle bearing universal joints with self-aligning intermediate ball bearings positively eliminate any "whip" or vibration of propeller shaft and insure smoothness of operation.

List price of the bus at the Auburn factory is $1,995.00.

Pontiac Executives Tour Country With 1936 Plans

Three groups of Pontiac executives left Detroit Tuesday for a two weeks' trip covering all sections of the country to hold meetings with the company's dealer organization. Plans and policies for 1936 will be discussed.

A. W. L. Gilpin, vice-president and general sales manager, heads the group covering the south and east. In Mr. Gilpin's party are G. D. Sills, assistant sales promotion manager; L. K. Marshall, general service manager; F. A. Berend, advertising manager, and R. B. Wright.

The second group headed by D. U. Bathrick, assistant general sales manager, and including G. W. Burrage, assistant service manager; W. A. P. John, vice-president of MacManus John and Adams, Inc., advertising agency, and L. H. Robinson will cover the middle west.

C. P. Simpson, assistant general sales manager, will head the third group made up of S. C. Bray, Denver zone manager; O. A. Lamoreaux, parts and accessories manager; B. B. Kimball, assistant advertising manager, and P. A. Dean, manager of the business management department, which will tour the west.

1936 Prices on Cadillac and La Salle

CADILLAC

V-8

Series 70

5 Pass. Touring Sedan	$2445
2 Pass. Coupe	2595
5 Pass. Convertible Sedan	2745
2 Pass. Convertible Coupe	2695

Series 75

5 Pass. Convertible Sedan	3395
5 Pass. Sedan, without trunk	2645
5 Pass. Touring Sedan	2645
5 Pass. Formal Sedan	3395
5 Pass. Town Sedan	3145
7 Pass. Sedan, without trunk	2795
7 Pass. Touring Sedan	2795
7 Pass. Imperial, without trunk	2995
7 Pass. Imperial Touring Sedan	2995
7 Pass. Town Car	4445

V-12

Series 80

5 Pass. Touring Sedan	3145
2 Pass. Coupe	3295
5 Pass. Convertible Sedan	3445
2 Pass. Convertible Coupe	3395

Series 85

5 Pass. Convertible Sedan	4095
5 Pass. Sedan, without trunk	$3345
5 Pass. Touring Sedan	3345
5 Pass. Formal Sedan	4095
5 Pass. Town Sedan	3845
7 Pass. Sedan, without trunk	3495
7 Pass. Touring Sedan	3495
7 Pass. Imperial, without trunk	3695
7 Pass. Imperial Touring Sedan	3695
7 Pass. Town Car	5145

V-16

Series 90

5 Pass. Convertible Sedan	7950
5 Pass. Town Sedan	7450
7 Pass. Sedan	7550
7 Pass. Limousine	7750

Series 60

Closed Coupe, opera seat	1645
Convertible Coupe, rumble seat	1725
Touring Sedan, 5 pass., 4 door	1695

La Salle

	New Price	*Old Price*	*Price Change*
Coupe, 2 pass.	$1175	$1225	—$50
Sedan, 5 pass., 2 door	1185	1255	— 70
Convertible Coupe	1255	1325	— 70
Sedan, 5 pass., 4 door	1225	1295	— 70

Glore, Hertz, Selig Join Studebaker Directorate

Paul G. Hoffman, president of the Studebaker Corp., has announced the election of three new directors of the corporation at a recent meeting of the board in South Bend. The new members are: Charles F. Glore, of Field, Glore and Company; John Hertz of Lehman Brothers, and Lester N. Selig, president of the General American Transportation Corporation. The new directors are to fill vacancies caused by the death of Ashton G. Bean and the resignations of Anthony L. Michel, Chicago attorney, and E. W. Strickland, South Bend attorney.

Vesper Reports Factory-Dealer Relations Better

Definite improvement in factory dealer relationships was reported by F. W. A. Vesper, N.A.D.A. president, at the opening session Wednesday of the association directors at St. Louis as shown by new provisions in dealer franchise contracts. The first day was given over entirely to various reports. An executive session was held Wednesday night and Thursday forenoon. "There is a decided tendency," he said, "among most of the manufacturers to turn their best thought and study to the distributive end of the industry, where heretofore attention was given almost exclusively to the problems of production."

J. Reed Lane of the N.A.D.A. Washington office reported on the status of the application for the regulation of trade practices now pending before the Federal Trade Commission. No decision, at the time the report was made, had been received from the commission. A report of the legal department of the organization recommended that state dealers associations work toward the enactment of enabling legislation to allow dealers to put into effect fair trade practices without running counter to existing state anti-trust laws.

Throughout the sessions and group conversations was ever present the subject of the introduction of models earlier this year than in the history of the trade and the effect this will have.

The luncheons of the directors on both days were held at the hour the World Series baseball games started, and as they ate they listened to radio reports of the games. Some of the directors stayed over Friday to be guests of President Vesper at Fredmar, his farm which is noted for its thoroughbred cattle.

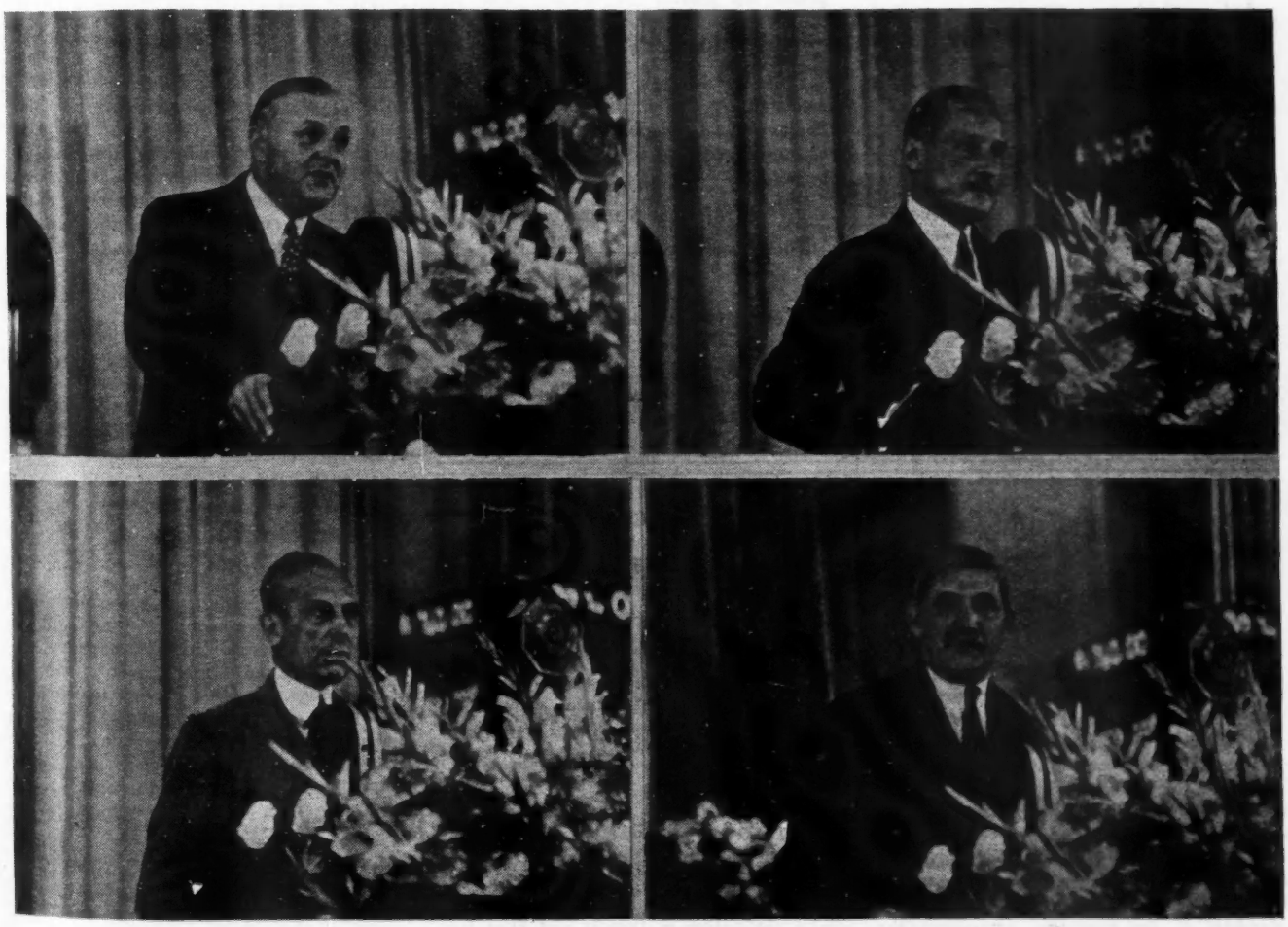
Portable Rock Crusher Developed by FWD Co.

A new portable rock crusher unit has been developed by FWD. The new machine consists of a 3-ton FWD (four-wheel drive) truck of the seat-over-motor type equipped with an overhead eccentric type rock crusher.

The crusher is mounted on the rear of the frame and driven direct from the main shaft of the transmission. The rated capacity of the unit at its governed crushing speed of 300 rpm. ranges from 50 to 125 tons per day, varying in accordance with the hardness and size of the stone or gravel used.

Nash Ships Cars by Boat From Kenosha to London

Nash this week shipped a consignment of cars to its distributor in London, Eng., direct from Kenosha by boat. This is the first shipment of such merchandise ever made direct from the Wisconsin city. The ship was the Glitrefjell of the Norwegian Fjell line.



Candid camera shots of General Motors executives who spoke at the dinner given for Buick officials by Flint Chamber of Commerce. Upper row shows W. A. Fisher, left; Harlow H. Curtice, Buick president, right. Lower, Alfred P. Sloan, Jr., GM president, left, and W. S. Knudsen, right; GM executive vice-president. The pictures were made by Hector Rabezzana, chief engineer of AC Spark Plug Co.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

General business activity held up well last week. Steel output was lower, but gains were registered in several other heavy industries. Both retail and wholesale business were better, with a good demand for autumn and winter clothing.

The Guaranty Trust Company's index of business activity for August stood at 72.3, as against 70.8 the month before and 66.3 for the corresponding month last year. The Company's index of wholesale commodity prices on September 15 was 54.2, as against 52.9 a month earlier and 52.4 a year earlier.

Freight Increase Continues

Railway freight loadings during the week ended September 21 amounted to 707,644 cars, which marks an increase of 7,287 cars above those during the preceding week, a rise of 63,146 cars above those a year ago, and an increase of 47,778 cars above those two years ago.

Food Prices Gain Slightly

Retail food prices during the two weeks ended September 10 increased 0.7 per cent, according to the Bureau of Labor Statistics. The current index stands at 123.9, based on the 1913 average as 100, which marks an increase of 6 per cent above that in the corresponding period last year.

Exports, Imports Drop

Total exports during August amounted to $172,204,000, marking a decline of slightly less than 1 per cent below those in the corresponding period last year. Imports totaled $170,139,000, representing a decline of 4 per cent below those a year ago.

Farm Income Higher

According to the Bureau of Agricultural Economics, farm income during the first eight months of this year, including government rental and benefit payments, amounted to $4,020,000,000, as against $3,754,000,000 in the corresponding period last year.

More Crude Produced

Average daily crude oil production for the week ended September 21 amounted to 2,774,500 barrels, as against 2,749,850 barrels for the preceding week and 2,448,000 barrels for the corresponding period last year.

Fisher's Index

Professor Fisher's index of wholesale commodity prices during the week ended September 28 stood at 85.5, as against 85.2 the week before and 85.1 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended September 25 showed no changes in holdings of discounted bills, bills bought in the open market, and government securities. Money in circulation declined $6,000,000, and monetary gold stocks increased $57,000,000.

GM to Build Assembly Plant at Mexico City

The establishment of a new assembly plant at Mexico City has been announced by the General Motors Export Division. The new plant will be operated by a subsidiary which will be known as General Motors de Mexico, S. A.

Ten acres of land have been purchased in the Federal District on which a factory building and offices are to be erected, construction to commence immediately. The buildings will have a floor area of 100,000 square feet. For the present manufacturing operations will be confined to Chevrolet truck assembly and a commercial body building plant with a warehouse for passenger cars.

Ivan C. Dresser, formerly sales manager of General Motors Continental, at Antwerp, has been appointed managing director of the new Mexican company. Other officials of the company are: A. W. Ellis, sales manager; R. A. Wilson, treasurer; F. B. Rhuberry, production manager; B. W. Stone, supply manager; R. A. Hooper, parts and service manager; P. W. Rokohl, service representative; and Mark Dull and Alexander de Bottari, field representatives. The new plant will make it possible to take advantage of preferential import duties and government purchases.

G. M. Williams to Head Brake Lining Assoc.

The Brake Lining Manufacturers' Association at its annual meeting, September 16, in New York City, elected the following officers: president, G. M. Williams, president of Russell Manufacturing Co.; first vice-president, W. G. Kitchen, president of Allbestos Corporation; second vice-president, H. A. Gillies, vice-president of American Brakelok Corp.; treasurer, L. A. Hanson, treasurer of World-Bestos Corporation; general manager and secretary, W. J. Littlefield, formerly treasurer of Thorndike Co., of West Warren, Mass., and Assistant to the General Manager of Palmer Bros. Co. Members of the executive committee: the above officers and T. L. Gatke, president of the Gatke Corporation; M. F. Judd, general manager of Raybestos Division of Raybestos-Manhattan, Inc.; F. E. Schluter, president of Thermoid Rubber Co.; W. C. Dodge, Jr., of Keasbey & Mattison Company.

The meeting was informed that the Asbestos Institute representing the Brake Lining Manufacturers' Association and other groups of the asbestos industry had already held a conference with the Federal Trade Commission for the purpose of having approved a Voluntary Agreement which it is expected will be adopted in the asbestos industry.

Chevrolet Conducts First Nat'l Service Convention

Chevrolet Motor Co. held its first national service convention in Detroit and Flint last week, attended by the service managers of the company's nine regional and 43 zone territories, and representatives from the export and Canadian plants. Sessions began Monday, with detailed discussions of the passenger cars and trucks by members of the Chevrolet engineering staff, and continued through Tuesday and Wednesday at the Flint plant. The final session was held Thursday at the General Motors Building.

At the engineering session, held at the General Motors Proving Ground, James M. Crawford, chief engineer, discussed the close relationship that exists in the work of the two departments. Other engineers to speak were R. J. Waterbury, on bodies and sheet metal; E. G. Sprung, passenger car chassis; E. H. Shepard and Alex Taub, power plants; L. A. Chaminade, brake design; and J. W. Diederich, commercial car chassis. At the Flint plant, practical demonstrations of service operations and of special service tools were given.

Cadillac Distributors Preview 1936 Cars

Nearly 500 distributors, sales managers and other executive members of the Cadillac-LaSalle retail organization throughout the United States and Canada, met in Detroit Monday, Sept. 30, for a preview of the new 1936 lines of cars and discussion of the company's extensive merchandising and advertising plans. The meetings were conducted by Nicholas Dreystadt, general manager, and John C. Chick, general sales manager.

Timken Gets P.R.R. Order

The Pennsylvania Railroad placed an order this week with the Timken Roller Bearing Co. for roller bearings to equip all axles on tenders of eight steam locomotives.

Motor Steel Takings Continue to Increase

New Buying for 1936 Car, Parts Manufacture Boost Production Rate at Mills

Takings of steel by automotive consumers showed a further bulge this week, partly through the issuing of shipping instructions for old orders and partly through fresh buying by motor car manufacturers as well as parts makers. A gain of nearly 4 per cent in this week's rate of ingot production to 50.8 per cent of capacity, very close to the February peak, is exceeded by the demand upon finishing capacity, which in the Detroit area has attained 100 per cent, with mills in the Cleveland, Youngstown and Chicago as well as Buffalo districts also having stepped up operating rates considerably.

In a statement issued by the American Iron and Steel Institute the other day, comparison is made between the price level for automobile sheets in 1920 and at the present time, a dip of 64 per cent being recorded. While the year 1920 was one of abnormal prices in the steel market, the price of sheet bars averaging around $65, as compared with $28 today, it is interesting to note that the spread between the cost of the semi-finished material and the finished body stock, which went to 7c in that year, was $75 per ton, while today it is only $31. In the interval between 7c sheet prices and the present 2.95c base, has come into use the continuous mill, which, as a steel mill superintendent put it the other day, "produces wider and more perfect sheet steel with mechanical precision, whereas it used to require 14 or more operations by handworkers."

With a considerable slice of the $140,000,000 ear-marked for steel mill improvements in 1935 set aside for such continuous mills, it is only natural that those who are in the habit of translating mechanical refinements into dollars and cents, are not losing sight of the possibility of further economies in the production cost of those flat steels that play the stellar role in automotive consumption of ferrous products.

Pig Iron—All of the markets show considerably more activity. Automotive foundries are not merely buying more one and two carload lots, but in some instances round tonnage transactions are consummated. Prices are unchanged, with the conviction steadily growing that first quarter 1936 prices will be moderately higher.

Aluminum—With better demand from automotive consumers, prices for both primary and secondary metal, while unchanged, have turned firmer.

Copper—Domestic demand is still disappointingly light, being at the rate of between 45,000 and 50,000 tons a month. European developments are likely to be the paramount influence in the market for some time to come. The price remains at 9 cents, delivered Connecticut, both in the first hand and "outside" markets.

Tin—With the London market highly nervous over the possibility of difficulties in shipping tin from the Far East, the price for spot Straits rose ⅜ cent a pound at the week's opening, holders asking 50¼ cents.

Lead—Producers are rather reluctant to quote on deferred deliveries. Storage battery manufacturers figure prominently among buyers. Market firm.

Zinc—Ore output was sharply curtailed this week. Metal prices unchanged and firm.

Cadmium—Cadmium is in scant supply. The price is nominally 85 cents.

Harnischfeger Transfers Liebich to Detroit Area

The Harnischfeger Corporation has appointed Frank Liebich as District Manager in charge of the company's operations in the Detroit area. Mr. Liebich, who moves to Detroit from the corporation's Chicago office, will have charge of the complete line of products including excavators, cranes, welders, hoists, motors, lighting plants and brewery equipment.

Hudson Distributors Meet

The Hudson distributing organization met in Detroit Friday and Saturday, Sept. 27 and 28 to hear the company's announcement of the 1936 cars and the sales policy for the coming year. Roy Chapin, president; A. E. Barit, vice-president and general manager; William R. Tracy, vice-president and general sales manager; Stuart G. Baits, chief engineer, and William A. James, advertising manager, spoke at the meetings.

Republic Promotes Distler

J. P. Distler has been appointed manager of the wire division of Republic Steel with headquarters at Grand Crossing plant, Chicago, according to N. J. Clarke, vice-president in charge of sales. Mr. Distler replaces R. W. Hull, who will devote his entire time to sales of all Republic products in the Chicago district.

Governmental Loans to Industry Held Inadequate

Machinery created by government to finance business, particularly small business, has not functioned altogether satisfactorily, according to a study entitled, "What About Direct Loans to Industry?" just released by a committee representing the 130 member publications of the Associated Business Papers, Inc., and the National Conference of Business Paper Editors. This study, which analyzes the record of Reconstruction Finance Corporation, of Federal Reserve System banks, and the Federal Housing Administration, points out that to date only a fraction of the funds intended for use by business has been released. The further point is made that railroads, insurance companies, banks and farmers have realized far greater benefits through Federal financing than has private business.

Of approximately $580,000,000 authorized for the specific purpose of bolstering credit for industry, only about $155,000,000 of loans have been approved one year after R.F.C. and Federal Reserve banks have been impowered to make direct loans. Reasons for this situation are analyzed.

The study shows that hesitancy to apply for loans traces to fear of red tape; reluctance to borrow; lack of knowledge; fear of possible government interference in management; animosity toward government measures to finance business and hesitancy to expand operations in the face of an uncertain future. Factors held important in turning down loans include insufficient security; unsound competitive situations; questionable management; unwillingness of management to reduce excessive disbursement of funds; poor accounting methods and lack of proper presentation to the loaning agencies.

This study available at 50 cents per copy through The Associated Business Papers, Inc., 330 West 42nd Street, New York.

CALENDAR OF COMING EVENTS

SHOWS

New York Automobile Show, New York, Nov. 2-9
Baltimore Automobile Show .....Nov. 2-9
San Francisco Automobile Show..Nov. 2-9
Washington, D. C. Automobile Show, Nov. 2-9
Detroit Automobile Show .....Nov. 9-16
Buffalo Automobile Show .....Nov. 9-16
Indianapolis Automobile Show....Nov. 9-16
Newark Automobile Show .....Nov. 9-16
Cincinnati Automobile Show ....Nov. 10-16
Pittsburgh Automobile Show.....Nov. 11-16
Philadelphia Automobile Show..Nov. 11-16
Toledo Automobile Show.....Nov. 15-21
Chicago Automobile Show.....Nov. 16-23
Portland, Ore., Automobile Show.Nov. 16-23
Minneapolis Automobile Show....Nov. 16-23
Columbus Automobile Show ....Nov. 22-28
Cleveland Automobile Show ....Nov. 23-30
Montreal Automobile Show .....Nov. 23-30
Kansas City Automobile Show, Nov. 30-Dec. 6
Milwaukee Automobile Show.Nov. 30-Dec. 6
Automotive Service Industries Show—Atlantic City .....Dec. 9-13

CONVENTIONS AND MEETINGS

American Society for Metals, Annual Meeting—Chicago .....Sept. 30-Oct. 4
American Welding Society, Chicago, Sept. 30-Oct. 4
Empire State Automobile Merchants Association, Albany, N. Y. ....Oct. 8-9
S.A.E. Transportation Meeting, Chicago .....Oct. 10
S.A.E. National Tractor Meeting, Chicago .....Oct. 10-11
National Safety Council, Louisville, Ky. .....October 14-18
American Trucking Associations, Inc., Chicago .....Oct. 14-15
American Gas Association—Atlantic City .....Oct. 14-18
Industrial Materials Exhibit, Hotel Astor, New York .....Oct. 21-25
Los Angeles .....Nov. 2- 9
S.A.E. Annual Dinner, New York....Nov. 4
Newark, N. J. .....Nov. 9-16
American Petroleum Institute—Los Angeles .....Nov. 11-14
Philadelphia .....Nov. 11-16
International Acetylene Association, Cleveland .....Nov. 12, 13, 15
Baltimore .....Nov. 2-9
National Industrial Traffic League—Chicago .....Nov. 20-21
Columbus, Ohio .....Nov. 23-28
SAE Annual Meeting, Detroit, Jan. 13-17, 1936

The Horizons of

Deliberate Unemployment

A MISTAKEN conception of economic cause and effect lies at the root of the nation's unemployment problem. The error is deliberate and will not yield to logic. It is the result of an assumption that the best way to increase the consumption of a product is to raise its price. This is not the way in which the automobile industry attained its present size and importance. It is not the principle upon which our great merchants achieved their success. In no other field has a surplus ever been reduced by raising the market price of the units. This statement should not require demonstration, but at the present time its validity most assuredly need not pause for lack of illustration. Cotton provides the most notable example.

Cotton Is a Notable Example

A well-meaning government sought to aid the Southern farmer by raising the price of American cotton. The fact that government funds were used in loans upon cotton is irrelevant. The important fact is that the price of American cotton was maintained above its natural level.

What is a natural price? It is the price at which demand will absorb the entire supply. There is nothing mysterious about the operation of this rule. If cotton is priced at 12 cents a pound, then it follows as a matter of plain horse sense that no buyer will pay that price unless he has some use for the staple which will justify the price.

With a Natural Price There Would Be No Surplus

The uses of cotton vary in value. If it were used for no other purpose than the manufacture of fine shirts it could conceivably be sold at 30 cents a pound. Unfortunately for the price structure, not enough fine shirts are made to use all the cotton that is raised. In order to consume the entire crop it is necessary to resort to what the economist calls "inferior uses," e.g., canvas, rope, bags, paper, and even as binding for certain types of bituminous aggregate used in highway construction. If the price of cotton "goes high hat" it certainly cannot be devoted to these more humble purposes. The uses of cotton are elastic and as the price declines consumption spreads into baser fields. Left to itself the price will fall until these additional uses will absorb the entire supply of cotton. That is the "equilibrium" or "natural" price. Here the demand and supply will be in balance and the surplus will disappear.

Labor Bought As a Commodity

Thus if there appear an excess in any commodity or service it is invariably an excess *at a price*. It is one of the basic principles of orthodox economics that no surplus can long abide the operation of free and natural market forces, since these forces sooner or later establish an equilibrium between demand and supply. This is the great argument for freedom in economics as against control.

How precisely does this principle apply to the current problem of unemployment? How can it possibly offer any guidance to the distracted statesman harrassed by the prospect of unending unemployment for one-fifth of the nation's working population? The solution may not be palatable po-

Business

By Joseph Stagg Lawrence

litically but it is certainly discoverable.

When an employer buys the service of a worker he is moved by the same considerations that affect him when he buys cotton. Forty hours of work by an employee must have a convertible value equal to the wages paid plus taxes, insurance, depreciation and other essential costs. If, through legislation or trade union power, a minimum wage is established it means that all the needs for labor which do not justify that minimum must remain unsatisfied. It likewise means that only such fraction of labor as can justify the minimum will be employed. Labor which is worth less than the minimum must remain idle for the same reason that cotton accumulates in warehouses when an artificial price is maintained.

Unemployed Mostly from Lower Scale

Since we have an appalling surplus of labor is it not reasonable to suppose that its existence is due to the maintenance of a minimum price so high that the demands for inferior labor services cannot be satisfied? Our great army of the unemployed consists largely of workers who would find rating in the lower scales of ability. With ten million unemployed there must be numerous specific exceptions to this statement, but it is doubtful if such exceptions constitute a substantial fraction of the total. This observation is strengthened by the knowledge that in many fields a scarcity of skilled, able workers is already asserting itself through higher wages.

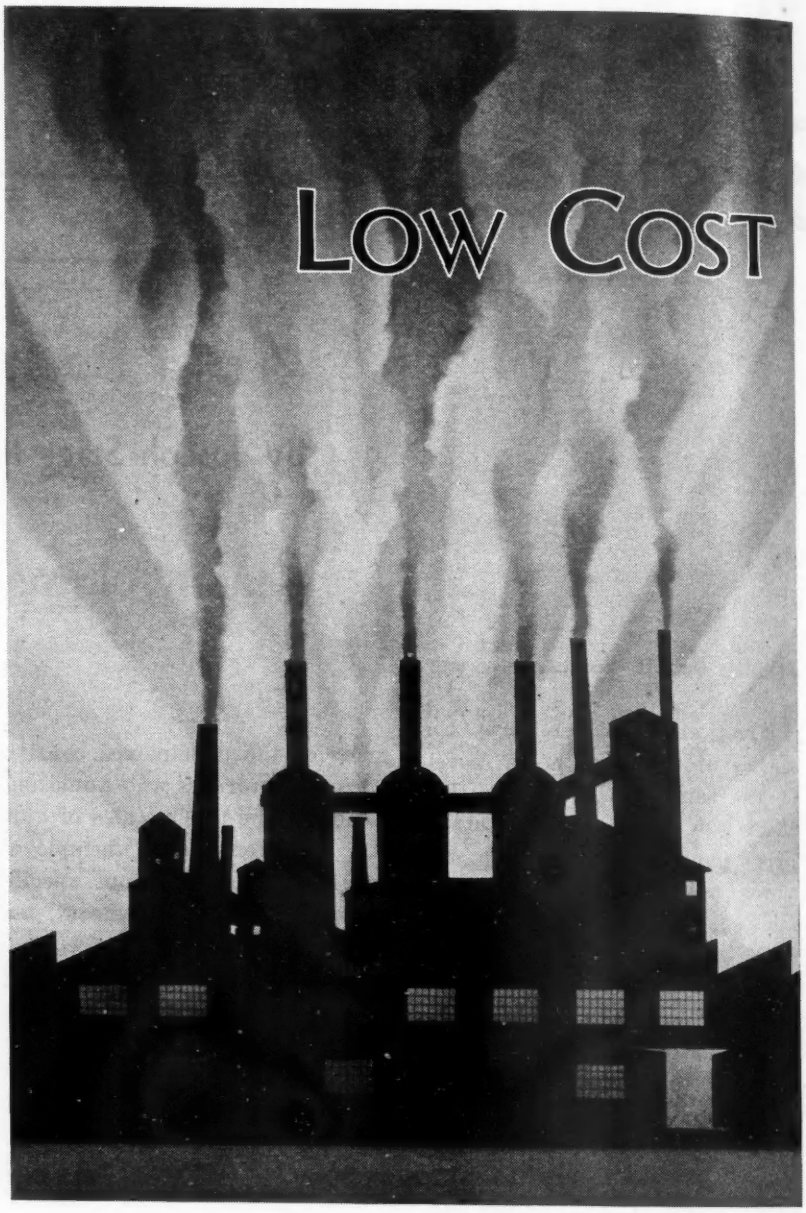
Higher Wage Scale Increases Unemployment

The fact is that we have fixed minima of compensation in the form of relief and union wage scales so high as to preclude the employment of the less able members of society. The prevailing wage of the WPA establishes as a minimum the general wage prevailing in each community. This means that the many who have never been able to earn this wage in private employment now receive it from the government. If the government is forced to abandon the prevailing wage principle and adopt the scale demanded by organized labor the price of labor will be raised still further and the number of those whose natural earning ability cannot justify this minimum will be increased.

The Worker Must Be Worthy of His Hire

This is another way of saying that the higher the minima established by the government and by organized labor the greater will be our unemployment, the greater the urge upon all employers to introduce labor-saving devices, the greater the drain upon the Federal treasury to support the idle, the more remote the prospect of budgetary balance and the more unstable the foundations of society.

No amount of streamline social philosophy can alter the fact that a worker must be worthy of his hire. Since the destiny which distributes the talents of energy and intelligence among toilers discriminates unconscionably in its favors there must always, unfortunately, be many whose hire is modest.



by R. E. W. Harrison
Former Chief, Machinery Division
Bureau Foreign & Domestic Commerce
Department of Commerce
Washington

THE irritating slowness of economic revival and the general waiting attitude of business lead once more to the question, often voiced during the hard times, of how business can act to break the impasse. Plans and planners there have been, with conflicting theories endlessly varied and nation-wide in scope, until an apathy has arisen against new theories. It may be timely, therefore, to re-appraise some of the tested and tried methods upon which businesses have stood or fallen both in normal times and throughout the depression.

After two years of experimentation, one of the old, sound maxims which emerges and is recognized by practically all agencies is that business must operate at a fair profit. Obvious as this may be, there are current trends and concepts which do not square, in all particulars, with this basic principle. The tendency to hail the rising price trend as an essential of recovery is particularly to be questioned in its relation to present profits.

It is true that depressions tend to break concurrently with a stiffening of the price structure and that farmers and other groups whose production volume is controlled largely by factors other than price are in line to benefit. But higher prices are not the sole aid to manufacturing industries, and may be for the present more of a hindrance.

Especially in industries where mass production methods are used, the element of profit is far more dependent upon volume and reduction of overhead and production cost, than upon the price increase to be currently expected in a competitive market. The present market is limited by lack of purchasing power; purchasing power is dependent upon re-employment; and re-employment in turn requires a greater volume of production. Increased prices and restricted purchasing power sometimes combine to inhibit volume and the vicious spiral of events in respect to some specific commodities fails to uncoil. So there may be some merit in working toward profits from the approach of reducing costs and thereby stimulating volume.

The basic laws of economics that operate in boom times have not been repealed through the depression. Just as a river flows by the same hydraulic principles in drought as in flood, the economic attractiveness of a product will force a flow of sales just as surely as water runs down hill. Attractiveness means technical merit, greater usefulness, better appearance, more convenient packaging, better distribution, and a variety of other things, but most of all, under present conditions, it means low price. Witness the continued securing of volume and profit experienced by the mail order houses and chain stores right through the depression.

It is a fallacy to say that high prices are necessary to prosperity. In a country as self-contained as ours, there can be a Low Cost Prosperity wherein reasonable prices will effectuate a sharing of national wealth as surely as higher wages or by the less desirable means now being preached by some radicals. If profits rise in the process, there is no loss to the buying public and the economic fabric will be strengthened because profitable business is the only kind of good business.

The need for reducing costs to realize profits and to stimulate volume may be

PROSPERITY

illustrated by the accompanying chart which brings out graphically the relationship between overhead and profit in a typical mass production plant. At the bottom of the depression, it was difficult for industries to finance themselves for the steps necessary in this direction. But, after a year of partial recovery and another year of stable business on a higher level, industry is in a far better position to renovize its operations. Many firms that have done it have strengthened their position. The modern slogan might well be "Down With Overhead; Up With Profits."

Profits may be realized through cutting costs and expanding the volume of operations in the following ways:

1. *Use the most productive machinery available.* Although single-track economists deplore mechanization as a cause of unemployment, the history of all progressive nations since the industrial revolution is proof that machine output is the true source of increasing national prosperity. The displacement of labor by a given machine is made up by the increased volume of production, the indirect stimulus to machinery makers and other related industries, and the dispersion of benefits among the service trades, which have tended to take up the slack in employment as mechanization increased. When a new machine helps make up the difference between profit and loss, when it increases the competitive advantage of a plant or an industry, it is an element of strength in bringing us out of the depression.

Recent surveys which definitely prove that 65 per cent of our manufacturing equipment is over 10 years old, indicate that the technique of production is much in need of a thorough over-hauling.

2. *Cut Distribution Costs to a Minimum.* Much has been said but not enough done about the fact that distribution procedure in many commodities is far less efficient than production. The industrial and commercial firms who have applied engineering technique rather than rule-of-thumb methods to distribution have been able to make substantial savings. Speedier distribution, better packaging, and allied improvements have helped capture new markets.

The technique employed by chain stores is probably in many instances resulting in greater efficiences than those realized in the production end. In any case there is ample evidence that there is room for much more marketing research than has hitherto been made available, as only in this way can we obtain accurate information in regard to marketing costs.

3. *Reduce Debt Service Charges if Necessary.* If, after a sharp scrutiny of a firm's operations, it appears that a reasonable profit cannot be earned with the market and facilities available, some scaling down of the capital superstructure is in order. An undue burden of fixed charges for dividends and interest will inhibit the reduction of prices and will limit the profit which can be made on new capital. The new corporate bankruptcy laws enable reorganizations to be made on a more equitable basis than heretofore. Federal advice and assistance is being rendered through the U. S. Bureau of Internal Revenue.

4. *Utilize the Minimum Acceptable Design to Accomplish the Given Engineering Purposes; No Frills.* Simplification of products to give good performance and acceptable quality at a minimum price is an aid to sales under present conditions. Restricted budgets have sharpened the critical judgment of the purchasing public. People can little afford gadgets and fancy work and if these frills add to cost, they are more likely to deter than to attract customers.

5. *Develop New Products, New Uses, and Improved Designs.* New uses for established products have been a saving factor for many firms during the depression. Keen competition exists, not only between the plants manufacturing the same product, but between the many competitive products which are more or less interchangeable. This requires constant attention to the problem of usefulness as well as price and other factors. New products and improved designs have been a creative force in maintaining business; have a better chance now to be aided by business revival and to help actuate the upturn. The hope often has been expressed that the impetus of new industry would break the depression. This lacking, new products in existing industries will go a long way to fill the need.

6. *Take the Minimum Acceptable Profit Until the Commercial Situation Has Been Strengthened.* After all possible economies have been effected, prices may be cut or may be held down in the face of advancing wage and materials costs. Low prices are necessary to furnish the buying incentive which maintains markets and leads to recovery. The expectation of higher prices gives force to this incentive, but an

Six Points for Profit Making

1. Use the most productive machinery available.
2. Cut distribution costs to a minimum.
3. Reduce debt service charges if necessary.
4. Eliminate frills in the design of products.
5. Develop new products, new uses, and improved designs.
6. Take the minimum acceptable profit.

actual increase is likely to cause a shift to competitive products; also to restrict real purchasing power so that the sales volume in goods will fail to rise even though the dollar volume gives the illusion of recovery. It is axiomatic that as much profit usually can be earned on heavy volume, sold at a reasonable margin as by a smaller volume sold at a higher unit price. Recovery of employment and thus of purchasing power obviously comes faster if volume is maintained in preference to price.

Examples of strong industries which have gone through the depression along these lines and of groups in a weaker position which have not profited by these measures may be cited through the whole range of industrial and commercial operations. A few cases will suffice.

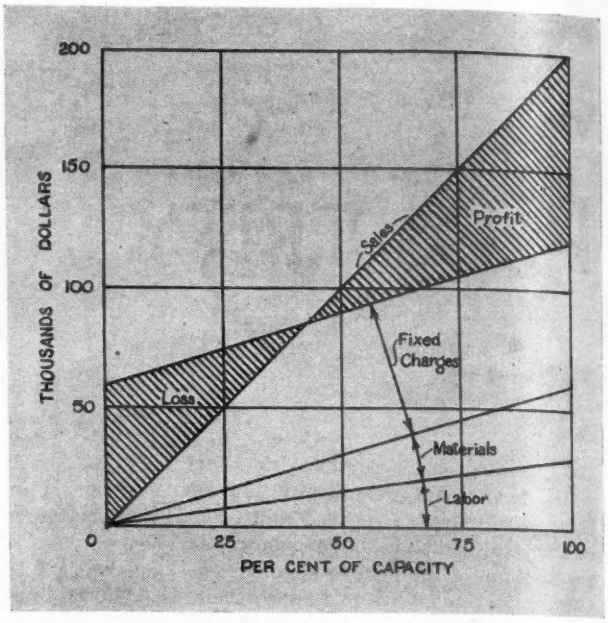
The automobile industry is an outstanding example of successful use of the above six points. Productive machinery has been improved and plant overhead reduced. A low-price policy has prevailed.

Frills developed to some extent, but are disappearing in order that low prices may be maintained. Yet the general performance, quality and relative operating economy of automobiles have improved. As in the depression of 1921, this industry has been the strongest factor toward recovery. True, the Federal highway construction program has opened new areas and improved existing routes, thus aiding both the automotive and the related oil and service industries. But aggressive action by the manufacturers was nevertheless the deciding factor.

By contrast, the housing industry, despite Federal financing and encouragement, has failed to live up to expectations. Many people want houses as much as they want cars. The attractiveness of home ownership has been enhanced by noteworthy development of new equipment and materials. Yet, building methods still are archaic in terms of production economy. The good $5,000 house remains as much of a vision as the good five-cent cigar.

In the face of rising materials costs and a stiffening labor market, it is essential that costs be cut, through more efficient methods, if homes are to be sold on a mass scale. Pre-fabrication and mass-production have been developed experimentally. Their application is now most timely.

Overhead in the transportation industry is particularly destructive both to profits and to the development of business. Railroads, it is true, have cut on maintenance costs, often to an unsound degree. Some have reorganized with R.F.C. aid and are earning a profit on a deflated financial structure. But in too many cases, over-capitalization with its attendant debt service burden is a barrier to profitable operation and to aggressive spending needed to improve equipment and to compete with trucks and buses. The obsolescence of railroad equipment is notorious. More than half the locomotives in this country are more than 20 years old. Rolling stock is similarly antiquated. The resultant inefficiency and maintenance cost is a heavy drag upon the industry.



This chart shows the relation between fixed charges and profits in a typical mass production plant

Under the merchant marine, the scaling down of costs is somewhat inhibited by the fact that, under our laws, United States ships are the most heavily manned in the world. Economies nevertheless may be effected through mechanization. Better motive power will mean faster schedules and fuel economies. Better loading equipment and wharf facilities likewise will cut time and costs, enabling American companies to offer improved earning power as a real inducement to potential investors.

In aviation, the problem is one rather of saving time at the airports than in cutting costs in general. A half-hour train ride to an air field may soon be the equivalent of 100 miles by air. Steps must be taken to reduce this disparity by construction of urban landings or by providing quicker access to outlying airports by air taxi service or otherwise.

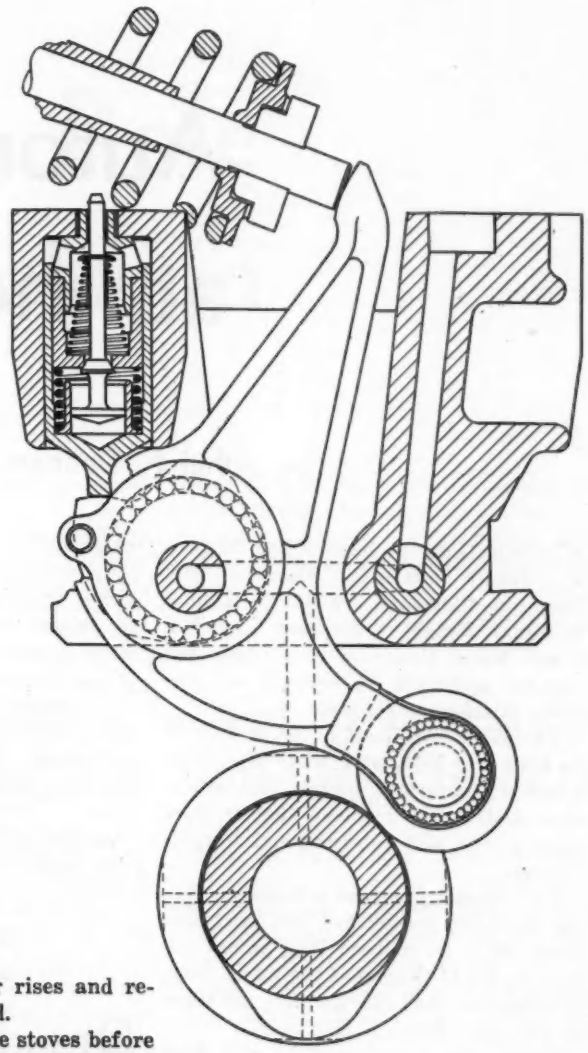
While high prices may merely inhibit domestic trade in a given item, they may wipe out entirely the foreign outlets. The technical merit of American machinery and machine-made goods is of the best. But price is often out of line. Other countries can make "Chinese copies"—or rather Japanese, German, or Czechoslovakian copies—of many American products and undersell in our own home market. Cheap labor is the assigned reason but our mass production methods have in the past always proved an adequate answer to cheap labor among our aggressive industries. Where foreign countries copy the methods as well as the products, the further answer has to be better methods through improved machinery.

Secretary Hull can help regain foreign markets through his reciprocal tariff bargaining, but it is up to the manufacturers themselves to retain this foothold by competitive selling. Under reciprocal agreements, they have the further problem of holding down prices in the domestic market in order that the lowering of tariffs will not lead to an undue influx of foreign goods.

High prices, whether arising from artificial measures such as the cotton curtailment program or from the inertia of manufacturers who fail to renovize and cut costs, are ruinous to foreign markets and are causing other countries to produce the items we formerly sold them in heavy volume.

Scores of other instances could be cited where failure to clean house and to cut overhead have kept business in the doldrums. While some politicians are advocating the sharing of dollar wealth, it is time for business leaders to set about sharing the real wealth and productive resources of the nation through lower costs whereby business can secure the volume necessary to make a profit, the jobless can be re-employed, and the economic welfare of the nation can be naturally restored through the orderly flow of trade.

Packard 12 Manifolding and Valve Take-Up



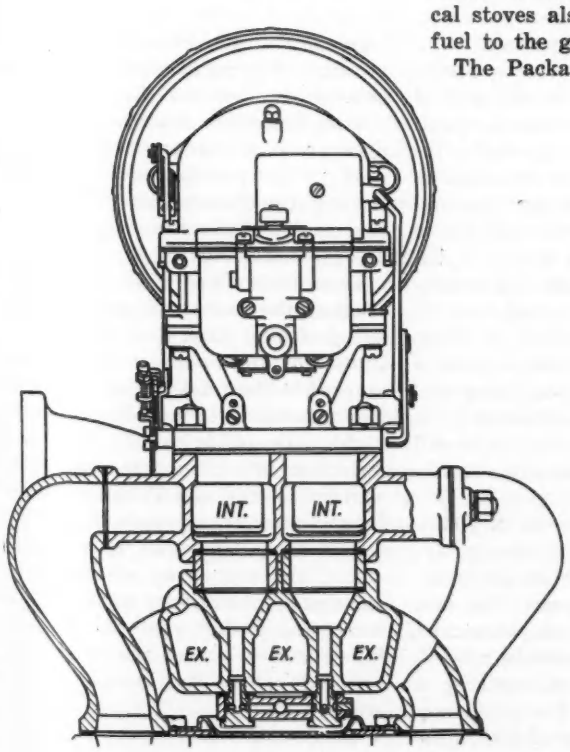
Automatic clearance take-up in valve gear of Packard Twelve engine

DRAWINGS of a number of features of the Packard 12 engine are reproduced herewith. These features, while not absolutely new, are interesting and have not been published before. One of these drawings shows the manifolding, for which latter it is claimed that it gives virtually "cold carburation." It will be seen that conical stoves are cast in the exhaust manifold directly below the carburetor venturi. That part of the inlet manifold adjacent to the stoves is of large cross-sectional area. This reduces the velocity of flow at this point, which facilitates the separating out of liquid fuel particles and their descent into the stoves. In the stoves this liquid fuel is vaporized, and the vapor rises and reenters the inlet manifold.

Liquid fuel entering the stoves before the latter are of sufficient temperature to vaporize it remains there until the stoves become hot enough. These conical stoves also serve to drain overflow fuel to the ground.

The Packard 12 engine also has an automatic clearance take-up, which is shown by the other drawing. Referring to this illustration, the clearance is taken up by the compression spring housed within the cylinder, this oil-filled chamber resisting movement in the opposite direction. The necessity for the dashpot arises from the fact that the oil-intake valve is located in a stationary part and the piston movement does not cause sufficient depression to take the valve off its seat. While oil is fed under pressure to the reservoirs, the unit itself is not under line pressure, the oil simply flowing by gravity from the reservoir into the cylinders.

Very close limits must be maintained in order that the device may function properly. As a matter of fact, the piston clearance is within limits of plus and minus 0.0001 in. Too rapid bleeding results in noisy operation, while too slow bleeding causes the engine valve to remain off its seat too long after having passed through a period of valve-spring disturbance.



Packard Twelve manifolding, showing conical stoves which boil off any gasoline that separates out of the mixture

Automotive Production at the National Metal

by Athel F. Denham

COMING on the heels of the tremendously successful Machine Tool Show in Cleveland, the 17th Annual National Metals Exposition and National Metal Congress in Chicago bid fair, at mid-week, to surpass all previous attendance records.

The exposition itself is the largest of its kind ever held, with some $2,000,000 worth of materials, metals and equipment distributed over the 40-acre floor space of the new International Amphitheatre.

The highest previous attendance record of 25,000 established last year also promised to be eclipsed long before the show closes at the end of the week. Registrations on the first two days ran some 50 per cent ahead of last year.

Automotive interests were well represented among the registrations, although the exposition and the technical sessions of the American Society for Metals, American Welding Society, Iron and Steel Division A.I.M.E. and Wire Association were of rather more interest to the metallurgical and experimental production divisions than to the general engineering and production branches of the automotive field.

Of particular automotive interest at the exposition were the numerous displays of die castings featuring recent developments for the automotive field and including everything from radiator grilles to glove box doors.

Also to be noted was the marked advance made in the design and operation of heat treating temperature control and recording instruments, much of which is apparently directly traceable to automotive requirements. As an example might be mentioned the adaptation of submerged contact points or mercury contacts readily applicable to lacquer drying ovens, etc., where the fire hazard is a serious consideration.

In this group should be mentioned the long distance temperature and pressure recording instruments by means of which control in a plant can be exercised from a central control room. It is reported that one of these installations is at present being made in one of the large automotive plants for the control of gas pressures throughout the plant.

Exhibited also is an interesting eyepiece for simple routine checking of grain size. An electric arc metal cutting saw attracted considerable attention.

At the general session of the American Society for Metals on Wednesday, the election of R. S. Archer as president of the society was announced. Mr. Archer, who is chief metallurgist of Republic Steel Corporation, succeeds Benjamin F. Shepherd and has been vice-president during the past year. E. C. Bain of U. S. Steel Corporation succeeds Mr. Archer as vice-president of the society.

An outstanding characteristic of the current Metals Show is the obvious improvement in showmanship characterizing the exhibits. The value of automotive products as attention-getters was exemplified in many interesting ways.

Following are brief abstracts of some of the papers presented before the American Society for Metals—Editor.

Deoxidation Has Pronounced Effect on Over Strain and Quenching of Steel

ONE of the most important variables determining the qualities of a heat of finished steel is the method and degree of deoxidation of the steel. This is known to exert a powerful influence on the response of the steel to a number of mechanical and thermal treatments, particularly its response to aging after cold working and to aging after quenching from subcritical temperatures. Inasmuch as aging may be regarded as either injurious or beneficial to steel, it is desirable to control the susceptibility of steel to aging and thus to enable the manufacturer deliberately to produce a steel that will or will not age to suit service requirements.

A paper contributed by B. N. Daniloff, R. F. Mehl and C. H. Herty, Jr., dealt with the behavior of steels deoxidized to different degrees. The first two of the authors are connected with Carnegie Institute of Technology, while Mr. Herty is metallurgical engineer of the Bethlehem Steel Co. The paper consisted partly of a review of the literature of the subject and partly of an account of experimental work carried out by the authors. In these experiments, the three common deoxidizers, manganese, silicon and aluminum, were used in the preparation of the steels. Among the conclusions reached from the results obtained and data gathered are the following:

Deoxidation has a very pronounced effect on the over-strain and the quench-aging of mild steel. Generally, the more thorough the deoxidation the less marked is the tendency of steel to age.

Normalized rimmed steels are very highly susceptible to *quench-aging*, the maximum effect being reached in steels containing 0.04 to 0.05 per cent carbon. In the semi-killed steels the aging is considerably less than in the rimmed steels, and the aging effect shows the same general tendency to diminish with increasing carbon content. The silicon-killed steels quench-age considerably, but only about half as much as the rimmed steels.

Steels killed with aluminum quench-

Plays Prominent Role Congress and Exposition

age very little, the degree of aging decreasing with increasing carbon content. In the carbon range of from 0.2 to 0.25 per cent, they become practically free from quench-aging.

Rimmed, semi-killed and silicon-killed steels are very susceptible to *over-strain aging* even in the higher carbon range. Aluminum-killed steels strain-age considerably less, the embrittling effect of the strain-aging treatment decreasing with the degree of deoxidation.

In the "as-rolled" condition all steels are very susceptible to over-strain aging. However, the strain-aged SMA steels possess a better impact resistance than the other aluminum-killed and semi-killed steels investigated.

The change in hardness with rising temperatures of quenching (575 to 1320 deg. F.) was determined and correlated to the degree of aging after quenching. The degree of hardening of normalized steels upon quenching from subcritical temperatures decreases with increasing carbon content and with the degree of deoxidation, indicating that both carbon and oxygen are factors determining the degree of supersaturation of the ferrite and consequently the aging properties of steel.

In view of considerable variations in the grain-size with the method of deoxidation, a brief study was made of the influence of grain-size variations on the aging characteristics of steel. Fine grain-size resulting from deoxidation with aluminum is partly responsible for the comparative immunity of nickel-killed steels to aging.

It is possible that highly dispersed alumina particles in the aluminum-treated steels may contribute to their non-aging properties, possibly by decreasing the rate of carbon diffusion in ferrite.

The effects of time and temperature on the aging characteristics of several steels were studied by means of aging tests carried out at elevated temperatures (68 to 575 deg. F.). Using these data, an attempt was made to demonstrate the independent precipitation of oxides.

Deoxidation decreases the tendency of mild steel to age, (1) because it lowers the dissolved oxygen content of the steel, (2) through the formation of finely divided particles of deoxidation products it refines the grain-size, and (3) possibly reduces the rate of carbon diffusion in ferrite.

Galvanic Action Claimed to be Cause of More Serious Pickling Defects

PICKLE pitting of steel by electrolytic potentials was the subject of a paper by C. H. McCollam and D. L. Warrick of the Timken Steel and Tube Co., Canton, Ohio. Pickle pitting is defined as localized attack during the pickling operation, resulting in surface pits of various sizes and depths. Over-pickling is evidenced either by a more or less uniform reduction in section of the material or by the appearance of porosity on the pickled surface. This porosity appears first on the transverse surfaces. Over-pickling is a function of the latter part of the pickling cycle only, while pickle pitting generally (though not always) has its inception during the early part of the operation.

Deep surface pitting had been consistently reported on certain pearlitic alloy steels pickled after annealing. The boundary of the pitted area was frequently marked by a deep narrow line of demarkation, indicating that the action was of an electrolytic nature. It was thought to be a function of the difference in potential between the scale and the scale-free areas during the pickling operation. In order to check this theory a program was inaugurated, first to measure the difference in electrical potential between metal and scale formed at different temperatures, then to correlate these differences with the surface characteristics of the steels after pickling.

From the results of the experimental work it was apparent that pickle pitting is frequently caused by an electrolytic couple set up between scale-free areas and scale formed above a certain critical temperature. This critical or transition temperature varies with the composition of the steel. When scale is formed below the transition temperature, neither the difference in electrical potential nor the depth of pitting from this cause is significant. When this temperature is exceeded the difference in potential, found to be approximately 0.6 volt, results in a galvanic action between the scale and the metal, which proceeds at the expense of the cleaned metal surface. This action continues throughout the pickling cycle, until scale removal is complete. The magnitude of the resulting pit is a function of time and current density.

In the past, this type of pitting has been generally attributed either to some inherent defect in the steel, such as segregation or inclusions, or to a defect resulting from fabrication, such as rolled-in scale, the presence of surface strains, etc. These factors may at times have certain effects, but it is believed that galvanic action is the basic cause of many of the more serious pickling defects.

Since the extent of pitting depends on time and current density, any means of reducing either of these factors will tend to alleviate the condition. Thus, by means of mechanical scale-breaking, large areas of clean metal are exposed to the electrolyte and the current density is correspondingly reduced.

An apparent remedy that immediate-

ly presents itself is electrolytic pickling. In this process a difference in potential is artificially maintained between two electrodes by an impressed voltage from an exterior source. However, any change in potential on an electrode that is imposed from outside the system becomes effective over the entire surface of the electrode. Therefore, the potentials of scaled and clean areas are raised or lowered alike according to the impressed voltage, and there appears to be little advantage in raising the potential of the electrode as a whole by means of electrolytic pickling.

Another common source of relief from certain pickling defects is the use of inhibitors. The authors conducted a fairly comprehensive study of pickling inhibitors, but the use of an inhibitor did not prevent pitting of the samples in any instance where the potential value was favorable to such action. A pickling inhibitor does not satisfactorily dampen the electrolytic action that is responsible for pickle pitting. After the scale has been removed, the inhibitory effect begins to assert itself, but it is apparent that even then there is a slow preferential attack of the pitted areas, probably due to the roughened surface of the pit.

Structural Composition Plays an Important Part in Notch Sensitivity

A STUDY of the damping characteristics and endurance properties of several steels in several conditions of heat treatment formed the basis of a paper by G. R. Brophy of the General Electric Co., entitled "Damping Capacity, a Factor in Fatigue."

The dependence of the endurance properties of steels on their damping capacities has been referred to frequently during the past few years, but attempts to correlate these properties have been unsuccessful, except for a single steel, for which it has been shown that as the damping capacity is increased or decreased by heat treatment, the endurance limit is changed inversely.

In the presence of stress concentrations, damping lends appreciable protection, as shown by the work done at the Woehler Institute and elsewhere. It might be expected, too, that damping influences the resistance of metals by overstress in the absence of notches.

Various factors controlling the damping capacity of steel have been studied, but the composition and structure are most important. Grain size, previously unrecognized among the structural differences, has been found of prime importance, and Mr. Brophy's paper includes a study of the influence of grain size on the damping capacity, and of damping on the damage resulting to steel in fatigue from notches and overstress.

Several steels were studied in various conditions of heat treatment, and were tested for damping capacity and endurance properties. All heat treatment was carried out on bars of either 1 or 1⅛ in. diameter and test bars machined after heat treatment.

Damping capacities were measured on a Foepple-Pertz machine in which a vertical bar is set in free torsional vibration. By means of a stylus, a trace is obtained of the decaying vibration, from which the decrement may be measured accurately. The specific damping capacity, which is twice the logarithmic decrement ($P = 2\delta$), is plotted against the corresponding maximum shearing stress in torsion during the vibration decay. This damping capacity, of course, represents an average value over the entire volume of the bar.

The endurance properties were obtained from cantilever bars. From actual fatigue tests made in both flexure and torsion, the ratio of the endurance limit in reversed torsion to the endurance limit in reversed flexure has been found to vary from 0.44 to 0.71, with an average value of 0.55, as compared with the theoretical 0.50. This value of 0.55 is supported by averaging Von Heidekampf's curves of the damping capacities of several steels tested in torsion and flexure. It is also necessary to pick some definite stress at which to determine the value of damping, since this property varies continuously with the stress. There are two possibilities: One may use either the damping capacities at shear stresses equivalent to the nominal notched endurance limit and plot these against the stress-concentration factors, or one may use the value of damping determined at the smooth endurance limit expressed in terms of maximum shear.

Using the factor 0.55, the nominal endurance limits, smooth and notched, were recalculated to maximum shear stress, and the damping capacities at these stresses were plotted against their respective stress-concentration factors (or the percentage of reduction). The values were scattered considerably, but this is supposed to be due to the use of the factor 0.55, which is only an average. There was better correlation between the notch sensitivity and the damping capacity at the notched endurance limit expressed in terms of maximum shear. That structural composition plays an important part in notch sensitivity is shown by the fact that the annealed plain carbon steels, having a considerable free ferrite content, and cast irons as a group fall well above the general curve, indicating greater resistance to notch effects. Increasing the grain size of any steel develops greater plasticity, as indicated by a marked rise in damping capacity.

Chromium Nitride Increases Hardening Capacity of Low Carbon Chromium Steel

RUSSELL FRANKS of Union Carbide and Carbon Research Laboratories, Niagara Falls, discussed the influence of nitrogen in steels of high chromium content. Observations strongly indicated that the marked refinement of grain imparted to the high chromium steels is brought about by nitrogen that is believed to be in combination with chromium as a nitride. Chromium nitride, representing only a few hundredths of a per cent, greatly increases the hardening capacity of low carbon 12 to 14 per cent chromium steels, a good indication that this nitride promotes austenite formation. The effect of this high solubility of the chromium nitride in the carbon iron of greater chromium content is far more pronounced, and in this respect the chromium nitrides seem to function in a manner similar to that of the carbides in ordinary steel. The addition of nitrogen to these low carbon, high-chromium irons therefore represents a practical metallurgical procedure designed to limit grain size and to improve strength and toughness without unduly increasing hardness associated with brittleness, a result invariably obtained when carbon is employed for a similar purpose.

Torsion Tests Reveal Some Important Fundamental Properties of Tool Steel

TORSION-Impact properties of tool steel were discussed in a paper by G. V. Luerssen and O. V. Greene of the Carpenter Steel Co. When the resistance to torsion-impact of a tool steel is plotted against the drawing temperature, a peak value is obtained for a relatively low drawing temperature

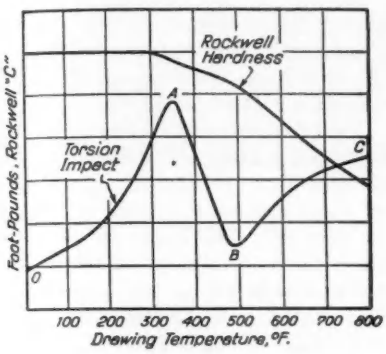


Fig. 1—Characteristic torsion impact and Rockwell hardness curves for carbon tool steel quenched at 1450 deg. Fahr. (790 deg. Cent.) and drawn.

(350-400 deg. F.), which is followed by a valley, the nadir of which corresponds to approximately 500 deg. A characteristic curve of 1 per cent carbon steel quenched in brine at 1450 deg. F., in which impact resistance is plotted against drawing temperature, is shown in Fig. 1.

The peak of impact at A, and the decrease in toughness as indicated by the drop in the curve from A to B are sharply at variance with the time-honored belief that the toughness of a hardened tool steel increases steadily with increasing drawing temperature. Consequently there appears to be need for an interpretation of the behavior of the steel in terms of more fundamental properties.

Torsion impact tests were made on a bar having an over-all length of approximately 4¾ in., the ends measuring ½ in. square. The test length was exactly 1 in. between fillets and the diameter, ¼ in. The test was made by properly chucking this test specimen so that it could be broken suddenly in torsion and the absorbed energy accurately measured.

It was shown in the paper that the three stages in the characteristic torsion-impact curve for a quenched and drawn high-carbon steel shown in Fig. 1 coincide with the three universally recognized structural stages traversed in the tempering operation. The first structural stage is characterized by stress relief in the martensite. Coincident with this change the torsion impact curve rises from O to A. The second structural stage involves the transformation of retained austenite to martensite, accompanied by a drop in the impact curve from A to B. This stage was studied in some detail, and it was shown that the drop in the impact curve is caused by a rapid loss in ductility, which in turn results from the breakdown of austenite to the less ductile martensite. During the third structural stage, martensite gradually decomposes to the softer and more ductile constituents, with an accompanying rise in the torsion impact curve from B to C.

The torsion test thus reveals some very important fundamental properties of hardened and drawn tool steels. The authors point out, however, that care must be exercised when it is applied to practical problems. When due precautions are observed the test becomes a valuable mechanism for the selection of proper heat treating procedure and thus affords a means of control which should make for better and more uniformly heat-treated tools.

High Temperature Properties of Age-Hardening Alloys Discussed

HIGH-TEMPERATURE properties of nickel-cobalt-iron-base, age-hardening alloys were discussed in a paper by Charles R. Austin, associate professor of metallurgy in Pennsylvania State College. This paper was a sequel to one presented to the Institute of Metals in 1932, in which particular attention was directed to two alloys. "Konal," containing 73 nickel, 17 cobalt and 10 ferrotitanium, was regarded as the base alloy, since this was the one of early development, and K42B containing 46 per cent nickel, 25 per cent cobalt, 10 per cent ferrotitanium and 19 per cent chromium, was considered the most interesting and promising alloy for high temperature service, on account of its remarkable tensile properties at elevated temperatures. Data on the creep characteristics of "Konal" were also recorded.

The paper presented at this meeting covered a more extensive study of the properties of the alloys previously discussed as well as an extended investigation of new or modified alloys, modification referring particularly to the addition or substitution of molybdenum, tungsten, vanadium and aluminum to alloy compositions approximating the K42B specifications.

Characteristics of 1 Per Cent Carbon Tool Steel Studied

ANOTHER contribution to the symposium on tool steels was by T. G. Digges and Louis Jordan, members of the metallurgical staff of the National Bureau of Standards. They described experimental work carried out at the bureau as part of a comprehensive study of the characteristics of commercial 1 per cent carbon tool steels.

Two commercial 1 per cent steels were selected, on the basis of widely different hardening characteristics, for a detailed study of the relation of the initial structure, prior to heating for hardening, on the austenitic grain-size and grain-growth characteristics. Austenitic grain-size measurements were made and critical cooling rates were determined for the temperature range from 1425 to 1775 deg. F. The data thus secured permitted the derivation of grain-size-critical cooling rate relations throughout this range of temperature.

For quenching temperatures below that at which all the carbon is completely dissolved in the austenite, both austenitic grain-size and critical cooling rates are influenced to a large degree by the initial structure of the steels. Above this temperature, each steel approached both a grain-size and a critical cooling rate which was characteristic of the steel regardless of its initial structure.

At the highest temperature, 1775 deg. F., the characteristic grain-size was smaller and the characteristic critical cooling rate was higher for the steel

known to have been made under conditions producing so-called controlled grain-size steel.

In the correlation of austenitic grain-size with critical cooling rates the non-controlled grain-size steel showed a marked effect of grain-size throughout the entire range of quenching temperatures. The influence of the initial structure was also evident at the lower quenching temperatures.

The critical cooling rate of the controlled grain-size steel changed very appreciably with little or no change in austenitic grain-size. At the lower quenching temperatures difference in carbon content and carbon distribution in the austenite may be the controlling factors, but at higher temperatures oxides or carbides introduced for grain control are probably the effective factors in changing the critical cooling rate.

The initial structure of the controlled grain-size steel exerts an influence on the grain-size-critical cooling rate relations at both low and high quenching temperatures.

A few determinations made on a non-controlled grain-size steel indicated that the critical cooling rate of this steel with austenitic grains containing carbon above eutectoid composition is lower than that for the same steel with grains of the same size containing about eutectoid proportions of carbon.

Endurance Tests of Case-Hardened Gears Show Varying Load Capacities

A PAPER on Endurance of Case-Hardened Gears was presented by O. W. McMullan of the International Nickel Co. In a previous paper it had been shown by Mr. McMullan that with the exception of fine-grained S.A.E. 4615, steels case-hardened by direct quenching decrease in load-carrying capacity with increase in case depth. This was particularly noticeable with steels of high alloy contents. When cooled in compound and single-treated, this tendency was reversed with the lower alloy contents and lessened with the higher. The strength of all double-treated samples increased with the increase of case depth. Highest load-carrying capacities were obtained with the higher alloy steels such as S.A.E. 2512, 4820, and Krupp, and the uncased oil-hardening steels were comparable to those listed both for load-carrying and shock resistance.

Since there are other factors besides case depth and alloy content which enter into the life of case-hardened parts, dynamometer tests were made on a number of steels with various heat treatments, the aim being to approach service conditions as closely as possible. The tests were made on automotive rear axle spiral bevel drive gears and pinions and tested to destruction, with inspection at regular intervals. The tooth load applied was equal to 60 per cent above full engine torque at low speed of the truck engine for which the gears were designed. This was 6400 lb.-ft., which gave a calculated stress of 52,500 lb. per sq. in. in tension at the root of the tooth. The lubricant used was in quantity equal to that of a similar rear axle for production and contained an E.P. addition. Housings were water-cooled to keep the maximum oil temperature around 200 deg. F. Surface temperatures at tooth contacts were unknown, but became sufficiently high in many cases to discolor the steel. The pinion speed was 350 r.p.m. and the gear ratio 6 3/5 to 1. Table I shows the average of three sets on each of the steels and treatments listed.

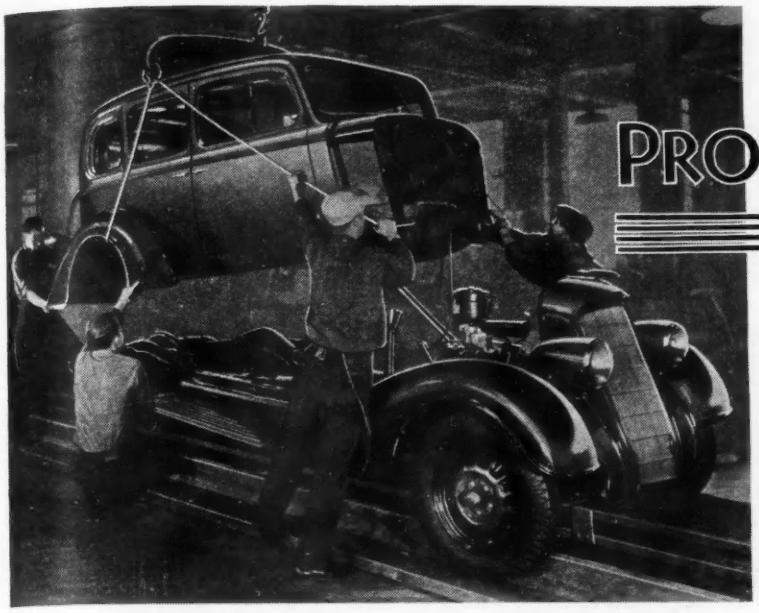
From these results the author concluded that uncased oil-hardened steels such as S.A.E. 4340 have good tooth strength for the gear but do not have the wear resistance necessary for long pinion life. Double-treated Krupp steel has excellent strength but is softened at low temperatures, and its life is short due to pinion failure. Pot-quenched 4615 apparently has sufficient austenite in the case to maintain file hardness at high operating temperatures and proved to be much better for pinions than stronger steels such as Krupp. The combination of pinions of pot-quenched 4615 and gears of Krupp or 4820 double-treated gave long life because of the necessary resistance to softening and wear and of strength where each was needed. The parts were so designed that the pinions of the weaker steel had sufficient strength when softening of the case did not occur.

(*Turn to Page* 465, *Please*)

Table I—Endurance Records

Ring Gear Steel and Treatment	Pinion Steel and Treatment	Number of Cycles	Remarks
S.A.E. 4340 Not cased. 1525° F. Oil. 400° F. Draw.	Same. 1525° F. Oil. 400° F. Draw.	67,300	Failure by teeth breaking out of gears. Both pinions and gears show much wear.
S.A.E. 4340 Carburized. 1525° F. Oil. 400° F. Draw.	S.A.E. 4340 Pot quench. 400° F. Draw.	35,700	Gears failed by teeth breaking out without much wear. Pinions show some wear and pitting of root at heel of teeth.
S.A.E. 4340 Carburized. 1525° F. Oil. 600° F. Draw.	Same. Pot quench. 600° F. Draw.	37,600	Many teeth broken out of the gears. Teeth show some wear. Pinions pitted at root of heel.
S.A.E. 4340 Carburized. 1525° F. Oil. 800° F. Draw.	Same. Pot quench. 800° F. Draw.	52,700	Many teeth broken out of the gears. Not much wear. Pinions badly pitted and scuffed.
S.A.E. 4340 Not cased. 1525° F. Oil. 400° F. Draw.	S.A.E. 4615 Pot quench.	81,000	One or more teeth broken out of gears. Not much wear on either gears or pinions.
Krupp Cool in pot. 1550° F. Oil. 1400° F. Oil. 300° F. Draw.	Krupp Pot quench. 1400° F. Oil. 300° F. Draw.	43,700	One to three teeth out of gears. Pinions badly scuffed and pitted.
Krupp Cool in pot. 1550° F. Oil. 1400° F. Oil. 300° F. Draw.	S.A.E. 4615 Pot quench.	108,500	Two teeth out of the gears but they do not show much wear. Pinions not worn much but show some pitting at root.
S.A.E. 4820 Cool in pot. 1550° F. Oil. 1400° F. Oil. 350° F. Draw.	S.A.E. 2315 Pot quench.	65,300	Teeth worn and four broken out of one gear; others not broken but show some wear. Pinions pitted at root of heel. Final failure on two of the three tests was in the differential and the average number of cycles probably should be higher.
S.A.E. 4820 Cool in pot. 1550° F. Oil. 1400° F. Oil. 350° F. Draw.	S.A.E. 4615 Pot quench.	136,000	One to three teeth broken out of gears. Gears show some wear. Pinion teeth pitted at the root of the heel.
S.A.E. 4615 Cool in pot. 1525° F. Oil. 350° F. Draw.	S.A.E. 4615 Pot quench.	50,600	One tooth out of gears; other teeth cracked. Not much wear. Pinions show some wear and pitting.

Note—Except where mentioned all the above pinions were not drawn on the teeth except due to heat creeping up from the stems when the latter were drawn at 1250 degrees Fahr. in lead.



PRODUCTION LINES

Gets Attention

New Departure had a tricky device that attracted crowds at the Cleveland Show. Picture two steel blocks on a table, set wide apart, and having their top surfaces inclined with respect to the vertical axis. Between the blocks and some distance above the level of the table—an oscillating ball bearing. Over each block is a hole some distance up the board. Steel balls drop one by one out of one of the holes onto the inclined surface of the block under it. They bounce up, go through the bearing and drop on the face of the other block. The balls bounce up but this time disappear into the hole over the second block. Perfect timing, perfect balls.

Steel Notes

A discussion of seven groups of alloy steels commonly used in the automotive industry is found in a new bulletin, "Some Notes on Bethlehem Alloy Steels," just off the press. This bulletin includes a physical property chart for each of the alloys. Engineers and metallurgists will be interested.

Cleanliness

Much attention has been paid to the sterilization of cutting fluids and cleanliness in general to protect the operators of metal-cutting equipment. Now comes another step. The Sanitary Institute of America is devoting a lot of its time to the principle of washing and sterilizing all wiping cloths. Minimum specifications have been adopted as to methods of sterilizing as well as the size, fabric and color. "Clean picked" rags are taboo so far as the S.I.A. is concerned. Here is a project well worth your attention.

Worth Having

Both Fellows Gear Shaper and Heald Machine came to the Machine Tool Show with some new books giving the story of their complete line of equipment. These bulletins are quite out of the ordinary run of trade literature. Factory executives and engineers will find a fund of practical information on each of these lines. They belong on your bookshelf—we'll help you place them there.

About Stamping

One of the big executives in discussing the Cleveland Show with us said that it's a pity that something like that has not been done for the sheet metal working industry. Lots of people would like to see a showing of presses, brakes, dies, dieing machines, and the like. Think it over.

New Bearing

Have you seen the Horrocks kingpin roller thrust bearing? Its chief feature is a floating retainer for the staright-sided rollers. The bearing is said to carry heavy loads without danger of seizure. It can be used for the kingpin, steering gear and clutch throwout.

Phenol Fibre

Dilecto—phenol fibre laminated material—a product of Continental Diamond Fibre—lends itself to a great variety of engineering and decorative applications. What they are, is the subject of a new handbook just off the press. It has everything that the engineer and purchasing agent wants to know. Applications—standard specs—suggestions for machining—et cetera. Ask us for a copy.

Weld Electrodes

Wilson Welder has issued an illustrated handbook dealing with its line of welding electrodes. It covers a great variety of applications and should be of wide interest. We can get you a copy.

Easy Jacking

More cars for next year solve a troublesome service problem—changing tires without crawling under. More cars provide jacking pads at the bumper bracket, following the practice first shown at the last Auto show.

Word-Unconscious

Look out for the new crop of coined names for special features of the 1936 cars. Once again the publicity departments have been extended to the limit to get novel effects. Once again we rejoice in the fact that we're not in their boots.

—J. G.

MANUFACTURING MANAGEMENT METALLURGY

Design Trends

Part III

Part II appeared in the issue of August 31, 1935. Part IV will be printed in an early issue

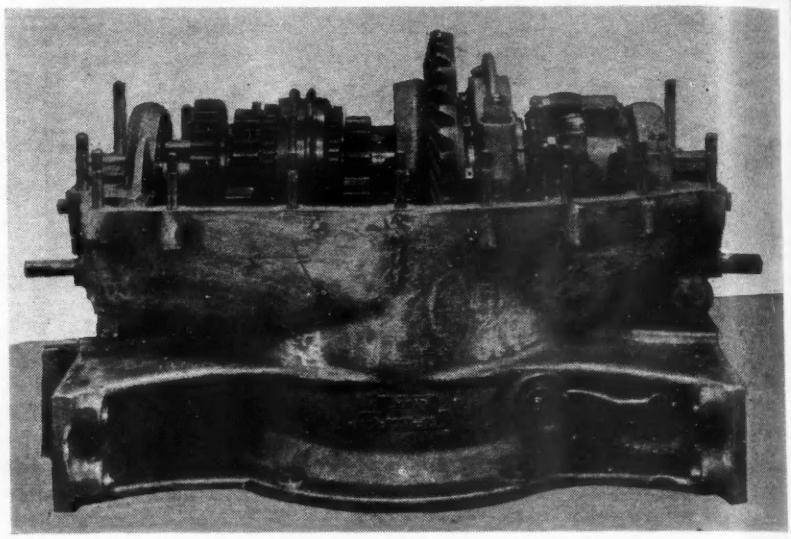


Figure 1 Transmission-drive unit of Ford front-drive racer

FIG. 1 shows the driving gears and transmission of the Ford front-drive racing cars which were built for this year's Indianapolis race. In this car the driving torque is multiplied by the bevel gear set before it is "handled" by the transmission, consequently the transmission gears are required to transmit much heavier torques. This is compensated for to a certain extent at least by the fact that their pitchline velocities are relatively low, so that shock loads are less. The advantage sought by placing the transmission in line with the differential is no doubt to be able to bring the engine closer up to the differential housing, thereby making it possible to use its weight to better advantage for traction purposes. The transmission in this case affords only two forward speeds, of which one is a direct drive and the other a double reduction through two pairs of spur gears, in the ratio of 10 to 8, which evidently was considered to best meet the requirements of the Indianapolis track. In addition to these two forward speeds there is also a reverse gear.

The lay-out of the transmission can be made out from the photograph. At the center may be seen the spiral-bevel ring gear through which the power is received from the clutch. This, of course, must be mounted on a hollow shaft, because the differential gear is located to the right of it and the driving shaft extending from the differential gear to the wheel on the left must pass through it. In addition, a hollow shaft from the differential gear to the transmission must pass through the hollow shaft from the ring gear to the transmission.

In the gear-assembly photo the sliding member by which the two forward gears are engaged is clearly shown. The clutches by which these two gear speeds are obtained are of the external-internal gear type. In one position of this clutch member the hollow shaft from the ring gear is coupled directly to the hollow shaft to the differential housing, while in the other position the drive is through the two pairs of gears in tandem. The gear on the extreme left is the reverse gear, which is shifted on the splined hollow shaft into and out of mesh.

One disadvantage of this construction would seem to be that it shortens the distance from the universal joints adjacent to the drive-gear housing to the universal joints near the driving wheel, and for a given spring action, increases the angularity of the shafts and of the two members of the universal joints. It is well known, of course, that the stresses on universal joints are the greater the larger the angle between the two connected shafts.

In this connection it is worth pointing out that in front drives as at present built, the non-uniformity in the drive introduced by the joint near the driving gear housing is not compensated for by the joints near the wheel. In the latter location some form of "constant-velocity" joint is always used. This is necessary because when the front wheels are swung around to the limit in steering, they usually make an angle of about 35 deg. with the drive shafts, and if the two were connected by single conventional universal joints, the resulting speed fluctuations and stresses would be very great. Steering motion, of course, does not introduce any angularity between the connected shafts of the universal joints adjacent to the drive-gear housing. But if the universal at the wheel end is of the constant-velocity type, it cannot compensate for any fluctuations in speed due to angularity of the joint at the drive-gear housing if the latter is of the conventional type. This may not have been very important when very stiff front springs were used, together with long drive shafts; but in any front-drive cars of the future the front springs are apt to have about the same flexibility as the rear springs, and in that case it will be desirable to use constant-velocity universals also at the inner ends of the drive shafts, so that neither steering motion nor spring play can produce speed fluctuations of any consequence in the rotating parts.

While on the subject of front-wheel

Stimulate Interest in Powerplant-Drive Units

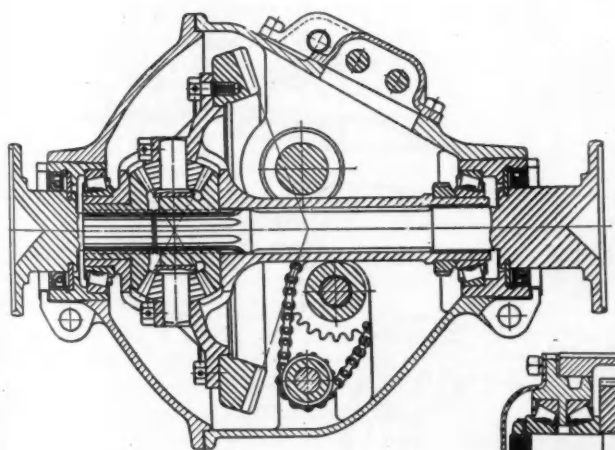
by P. M. Heldt
Engineering Editor, Automotive Industries

drives produced in this country, mention should be made of the cars designed and built by Roscoe C. Hoffman, of Detroit, which were described in *Automotive Industries* of March 7, 1931. Mr. Hoffman fully recognized the importance of keeping down the length of the hood and all that that implies, and in his car, the same as in the Ruxton, the transmission was balanced around the driving axle, some of the gears of the transmission being in front of and the remainder behind the axle. Final drive was by hypoid gears. A longitudinal section through the transmission is shown in Fig. 2.

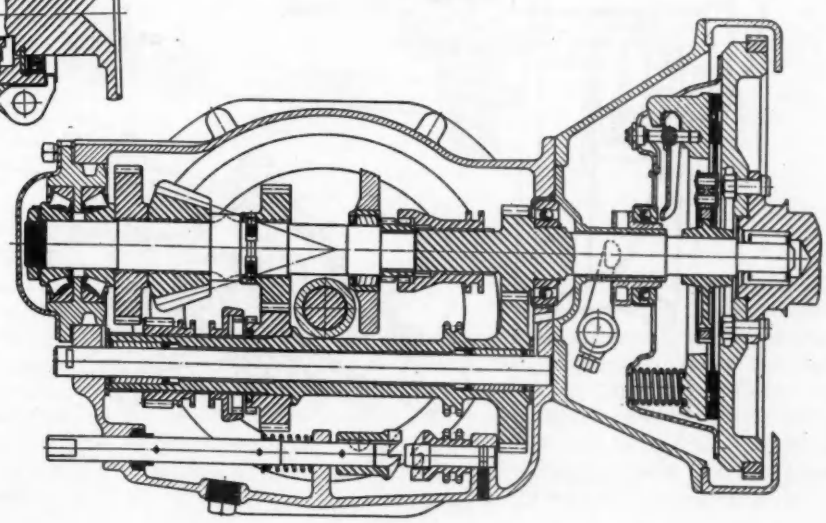
In the second instalment of this series, all of the various front-drive cars at present in production in Germany were described. In addition to these there was developed in that country some years ago a model known as the N.A.G.-Voran. The Nationale Automobil Gesellschaft, which sponsored this model, is a subsidiary of the German General Electric Company and one of the oldest manufacturers of motor vehicles in Germany. The Voran was a company organized after the war to exploit a particular design of front drive. It appears that shortly after the model here referred to was launched, the N.A.G. decided to quit the passenger-car field, so the car was never produced in any quantity and is not in production now. A merger was effected with the Buessing Commercial Car Works of Brunswick and the merger confines itself to the manufacture of commercial motor vehicles including railcars. It is the writer's understanding, however, that efforts are being made to interest other firms in this model, and there is therefore a possibility that it will still become a factor on the market. One car of this model was brought to this country and demonstrated in Detroit. The line drawings of details of this car and its engine shown herewith are reproduced from the *Automobiltechnische Zeitschrift*.

The N.A.G.-Voran front-drive car has a four-cylinder, opposed, air-cooled engine of 2¾ in. bore by 3¾ in. stroke (90 cu. in.) which is said to develop a maximum of 30 hp. at 3500 r.p.m. The flywheel, which is on the forward end of the engine, is developed in the form of a centrifugal blower with two outlets by which air is blown over the two banks of cylinders. In addition to being air-cooled, the engine is also oil-cooled. Whenever it runs beyond a cer-

Figure 2



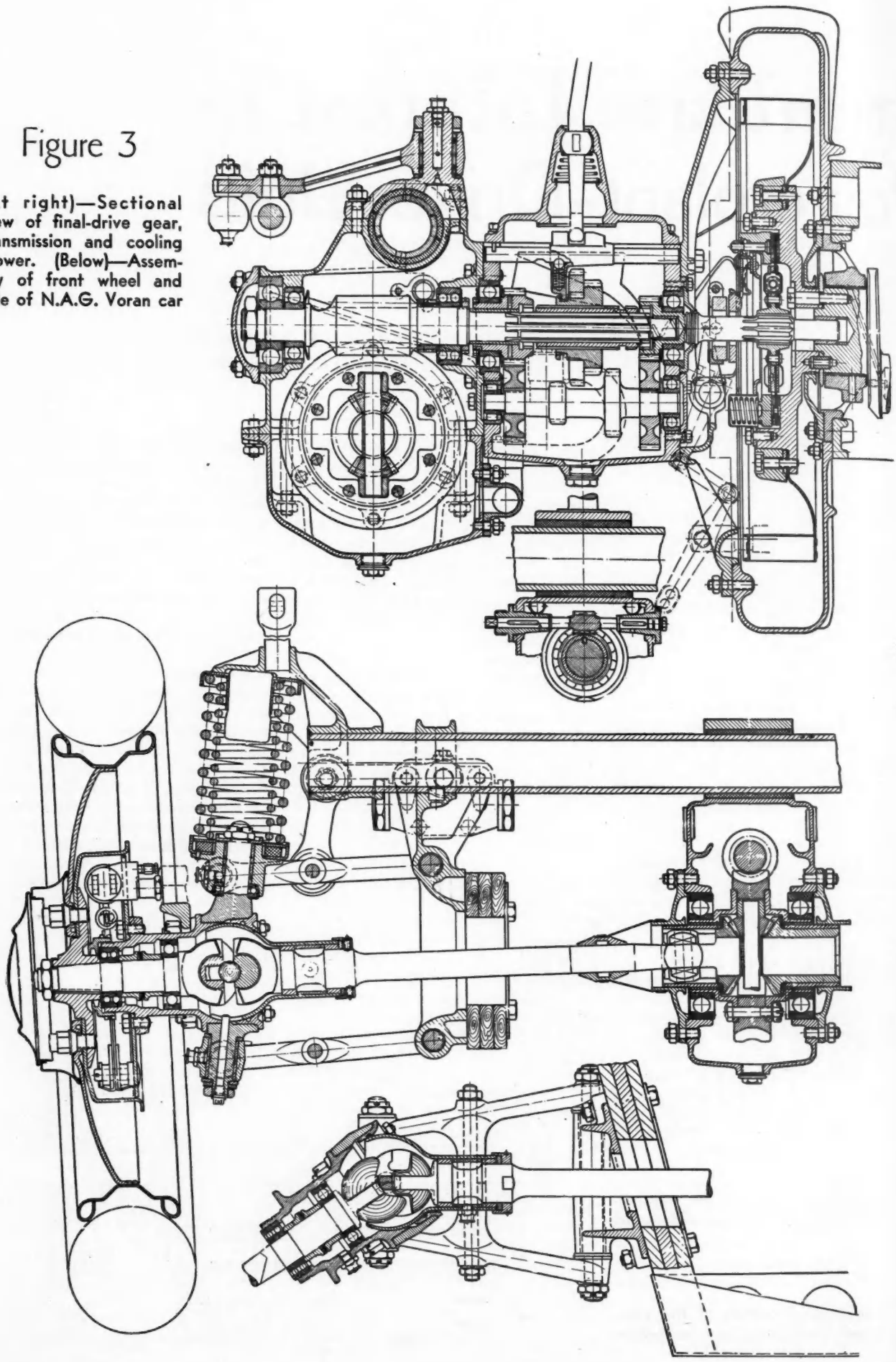
Transverse section of the transmission unit, showing the differential



Longitudinal section of the combined transmission and front-drive axle assembly

Figure 3

(At right)—Sectional view of final-drive gear, transmission and cooling blower. (Below)—Assembly of front wheel and axle of N.A.G. Voran car



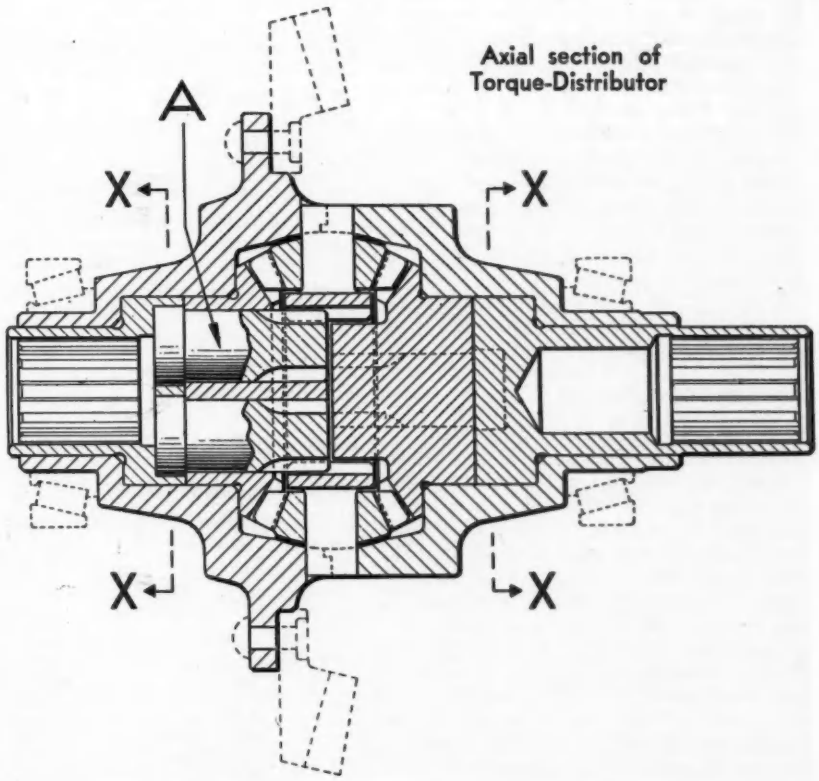
tain moderate speed, oil is discharged from a number of nozzles inside the crankcase, some discharging into the pistons, and the oil spray thus formed absorbs a large amount of heat from the piston and cylinder walls. The dry sump system of lubrication is used, oil being withdrawn from the sump as soon as it collects therein.

The single-plate clutch is built into the flywheel and transmits the power to a compact four-speed transmission of which the two high-speed gears are of the silent helical type and remain in mesh continuously. Final drive is through a worm and wheel combination. Front wheels are mounted on two wishbone-type links of nearly equal length, one above the other. Suspension is by two concentric coiled springs directly in line with the steering spindle. The arrangement of the steering head is rather different from that employed with other front independent suspensions, in that the vertical part of the steering knuckle has trunnions at top and bottom mounted in bearings or trunnion blocks which are pivoted to the ends of the wishbone-type links. The upper ends of the coiled springs bear against a bracket extending from the ends of a tubular frame cross member. The universal joints close to the wheel are enclosed in spherical housings. Rubber bumpers are provided inside the coiled springs and there are double-acting hydraulic shock absorbers whose links connect to the upper of the two wishbone links.

In this design no particular efforts seem to have been made to move the weight forward, except by selecting a type of engine which is inherently short. In fact, the four-speed transmission is somewhat longer than the three-speed type more commonly used with front-drive power units, and in addition the unusually large "starter-generator" which is mounted directly on an extension of the engine crankshaft and therefore must be much heavier than if the starter drive were through a pinion and flywheel ring gear, is at the rear of the engine, at a considerable distance from the front axle. The narrowness of the engine, however, makes up for this, and the distance from the axis of the differential to the rear end of the engine is only about 42 in. This car, which also has rear independent suspension, is said to ride very comfortably and to corner nicely. Mechanical details are shown on the opposite page.

A New Substitute for the Differential

A SUBSTITUTE for the conventional differential gear, known as the torque-distributor, has been placed on the market by the Torque-Distributor Co., San Francisco, Cal. It is claimed that the torque-distributor overcomes the one defect of the conventional differential in that the sum total of the traction available under both wheels is available for pulling at all times, and that one wheel cannot spin. The drawing reproduced herewith is a section through the axis of the torque-distributor. It will be seen that there is only one element added to the parts of the conventional differential, this being a torque-distributing pin *A*. The power flow is from the ring gear to the case, thence to a differential spider with its four differential pinions, and from these to the two differential side gears. The latter, however, are not directly connected to the axle shafts, as in the conventional construction, but indirectly, through the torque-distributing pins, which are journaled in the side gears and are rotatable therein. They are also journaled in the axle driving members and are free to rotate therein. The torque-distributing pins have rotation imparted to them only when the differential side gears are moving faster and slower than the case respectively. This rotation results from the gear teeth at the ends of the pins meshing with the internal teeth in the spider.



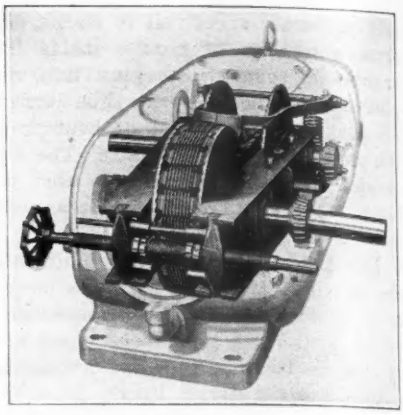
Axial section of Torque-Distributor

The torque-distributor has no adjustments or controls, is claimed to be absolutely silent in operation, and to function equally under both forward and backward motion. The action is said to be instantaneously automatic, as all relative motion of parts is rotary motion. Durability is said to be insured because the torque-distributing loads are carried on surfaces rather than on lines.

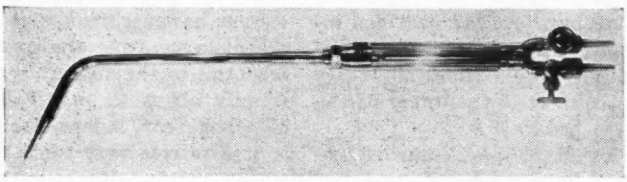
This device is being manufactured for the Torque-Distributor Co., Hobart Bldg., San Francisco, by the Fairfield Manufacturing Company of Lafayette, Ind. A replacement unit for the 1934-5 full-floating axle-type Ford truck is now in production and other replacement units will be announced later.

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools



Link-Belt Co. variable speed transmission



Purox No. 35 welding torch

New General Duty Welding Torch

The Purox No. 35 general duty welding torch has just been announced by The Linde Air Products Co., New York, N. Y. In mechanical details this new piece of equipment embodies many refinements in design and operation. Its range of usefulness makes it equally adaptable to the lightest as well as the heaviest work to be found in any welding shop. It is listed by Underwriters' Laboratories, Inc.

Individual mixers in each welding head are so designed that maximum resistance to flashback is afforded and at the same time the effective range of each size tip is greatly increased. Nine tips perform the duty of 15, the number usually required.

G-E Electric Thickness Gauge

A new electric gauge, developed for measuring the thickness of porcelain enamel, paint, or other nonmagnetic materials such as celluloid, glass, mica, etc., which have been applied to or laid on flat sheets or plates of steel or iron, has been introduced by the General Electric Company and was exhibited at the National Electrical and Radio Exposition in New York City, Sept. 18-25. It permits quick and convenient measurement of the thickness of the material not only at the edges but in the middle or any other place where a flat surface slightly more than an inch in diameter can be found. Weighing only 7½ pounds complete, it can be used portably wherever a 110-volt, 60 cycle power supply is available.

The new instrument consists of a small indicating unit inclosed in a cast-aluminum cabinet and a ½ pound gauge head connected to the unit by cable. When the face of the gauge head is held in contact with the surface of the material to be measured, the thickness can be read directly on an indicating instrument mounted on the front of the cabinet. Because of its light weight, the gauge head can be moved readily to any point on the surface and the corresponding measurement conveniently taken.

Link Belt Transmission

Up to now the Link-Belt Company's P.I.V. gear variable speed transmission has been available only in sizes up to 10 hp., with horizontal box only and without reduction sets and the integral motor feature. Hereafter the entire line will be available in the following combinations and sizes:

(1) Motorized (when desired), with motor forming an integral part of the unit.

(2) With or without speed reduction gearing.

(3) With horizontal or vertical box.

(4) In five sizes up to 15 hp. capacity.

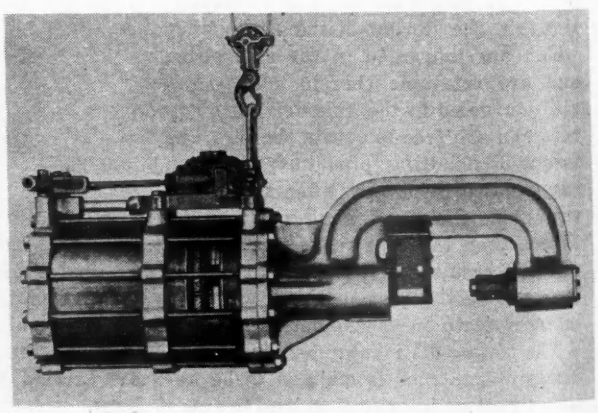
Hanna Press For Spring Shackle Bushings

The portable pneumatic press illustrated, is a recent development of the Hanna Engineering Works, Chicago, Ill. Although designed for pressing spring shackle bushings and pins in automobile chassis frames, it can also be used for pressing, punching, riveting, upsetting and similar operations. It is claimed that the two cylinder construction, with cylinders separated by a diaphragm, not only makes this unit very compact, but also results in reduced air consumption.

This tool is available in capacities of 3, 4 and 5 tons.

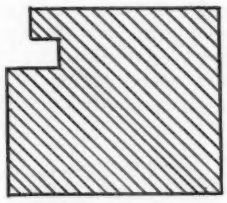
Pedrick Sealed-Channel Compression Ring

In our issue of Sept. 7 we published a description of the Pedrick sealed-channel (S. C.) compression ring recently placed on the market by the Wilkening Manufacturing Company of Philadelphia. Unfortunately the illustration which accompanied the description did not show the form of the ring very clearly. For this reason we show herewith an enlarged scale drawing of a section of the ring. It will be seen that the ring has a groove cut in its face, at some distance from the lower edge, which extends to within a short distance of the gap on each side. The narrow flange between the groove and the near side of the ring is undercut, so



Hanna portable pneumatic press

oil can readily enter the groove. This undercut also terminates a short distance from the gap of the ring. It may be recalled that the object of the oil groove is to collect oil during the down-stroke of the piston and to pay it out during the up-stroke, thus leaving a uniform film of lubricant on the cylinder bore which not only tends to prevent wear but also affords an effective seal against blow-by.

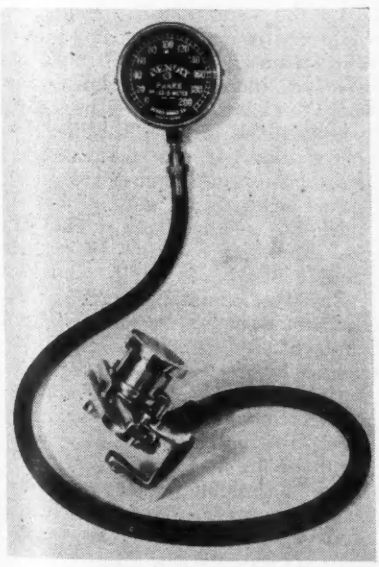


Section of Pedrick S. C. compression ring

Bendix Brake Press-O-Meter

A new product, called the Brake Press-O-Meter, has been announced by the Bendix Products Corporation, South Bend, Ind. The instrument is used to automatically determine the pedal pressure necessary to stop the vehicle under given conditions. It may be used either in conjunction with a brake-testing machine or when the automobile is actually running on the highway.

The unit is composed of a pump and scales connected by a high-pressure hose line. The pump is held in place on the brake pedal pad by two C clamps which form part of the assembly. A pressure pad is arranged for applying direct pressure to the pump. The hose line connecting the pump and scales head is of sufficient length to permit a second occupant of the car to hold the scales and record the pressure readings made by the driver. A bracket can be furnished to permit of the scale head being mounted on the steering column. A maximum hand on the face of the scale indicates peak pressures reached.



Bendix Brake Press-O-Meter

EX-CELL-O PRECISION THREAD GRINDERS

A truly modern means for the production of threaded parts of extremely high quality and precision at costs which compete favorably with methods now in common use.

Holds lead error to less than .0002; uses wet grinding method with long-life, 18-inch wheels; grinds from solid, hardened blanks. Adaptable to all forms of precision work whether on gauges or production parts.

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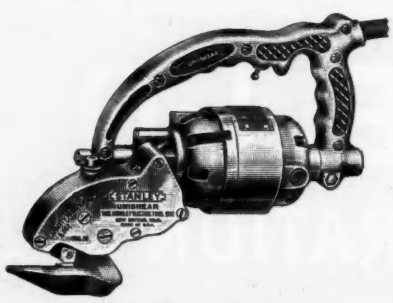
New Portable Unishear

A new portable electric unishear known as model 16, has been brought out by The Stanley Electric Tool Division of The Stanley Works, New Britain, Conn. Similar in appearance to the 18-gage "Mighty Midget," this 16-gage model illustrated has almost twice as much power and is of heavier construction. It is designed to cut straight lines, curves, notches and angles without burr or distortion. Inside cuts can be made after punching a 2-in. hole for the yoke. This unishear is capable of cutting up to 15 ft. per min.

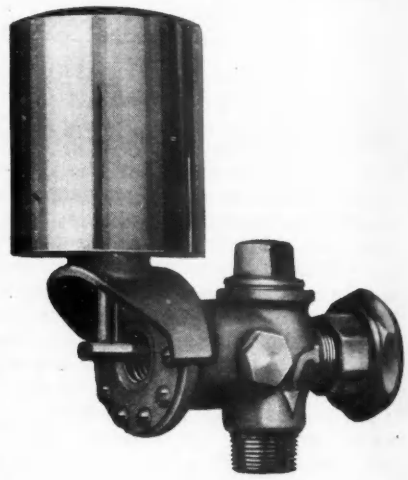


Stanley Unishear

Lammert Control Valve

The new control or automatic shut-off valve illustrated herewith is being manufactured by Lammert & Mann Co., 217 N. Wood Street, Chicago, in sizes from ⅜ in. up. It is claimed to be compact and of simple design, and elements for air control, steam-pressure control, water-pressure control and electrical control are interchangeable on it. Any of these controls is connected by merely screwing it into the standard valve body. Valves can be adapted to automatic operation, remote control, or automatic operation plus an interlock with a manual-reset device.

The valve itself has only two moving parts and when closed is held firmly in position by a cadmium-plated spring. Its needle and seat are of stainless steel and the remaining parts are also of non-corrodible materials. The operating lever, which is actuated by the control device, transmits the force to lift the needle valve. To eliminate the high resistance of a stuffing box, a packless gland in the form of a brass bellows is used. The interlock and manual reset device is a latch-and-weight arrangement which holds the valve in



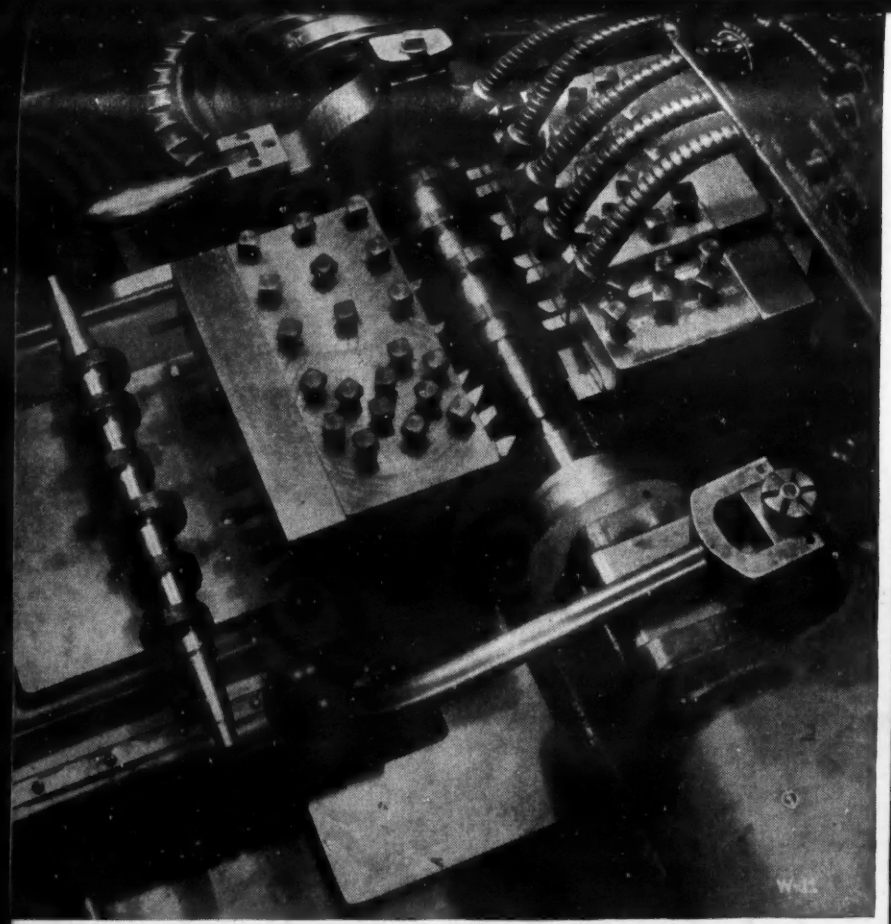
Lammert Control Valve

position after it has closed, until the weight has been reset manually.

The air-control mechanism is of the piston type, and pressure of three to 50 lb. may be used. The air-operated valve is used on oil burners of the air-atomizing type; it prevents oil dripping into the combustion chamber when the burner is off, and closes the valve automatically when the atomizing agent is absent.

In the steam or hydraulic control, the pressure operates through a bellows. The steam-oil and air-oil interlocks are used on industrial oil burners where the atomizing agent, either steam or air, and the oil are supplied by separate units. If the steam or air fails, the oil supply is immediately shut off, locked shut, and cannot be started until released by hand. This compels the attendant on duty to remedy the trouble which caused the shut-down.

Since solenoid-operated valves and springs gum or "coke up" in some kinds of liquids, due to the heat generated by the solenoid, the electrical control of the Lammert valve is through an electromagnet, and the spring which closes the valve is entirely separated from the fluid. It is fully enclosed, but easily accessible upon removing the metal-cup cover. The electrically-operated valve is used for the remote control of any liquid. It is closed by gravity assisted by a strong spring.



What Tools to Use!

No wonder last month's show started conversation! The *capacity* built into a modern machine tool is certainly something to talk about—capacity for range of work, capacity for high production speeds!

Better tools always increase the importance of *correct handling*. Correct fluids, correctly applied, are an absolute essential to maximum performance from these capable machines.

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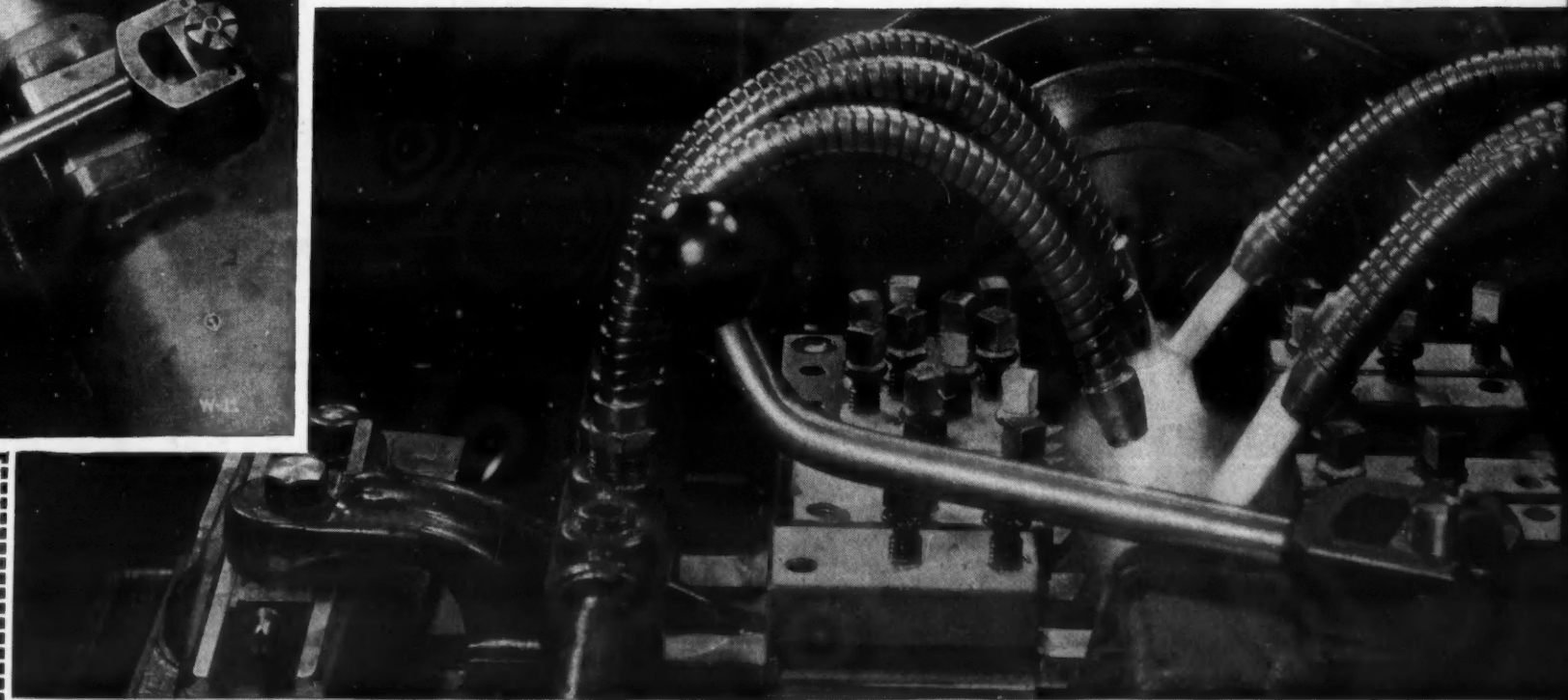

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(attach list of any additional subjects in which you are specifically interested.....)

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